SOLICITATION, OFFER AND AWARD

1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	RATING	PAGE OF PAGES
		1 | 2

2. CONTRACT NUMBER	3. SOLICITATION NUMBER	4. TYPE OF SOLICITATION	5. DATE ISSUED	6. REQUISITION/PURCHASE NUMBER
	NNM15536283R	☐ SEALED BID (IFB) ☒ NEGOTIATED (RFP)		

7. ISSUED BY	CODE	8. ADDRESS OFFER TO (If other than Item 7)
NASA/Marshall Space Flight Center Office of Procurement Marshall Space Flight Center AL 35812	MSFC	

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

SOLICITATION

9. Sealed offers in original and 1 copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8, or if hand carried, in the depository located in REFER TO SECTION L until _____ (Hour) local time _____ (Date)

CAUTION: LATE Submissions, Modifications, and Withdrawals: See Section L, Provision No. 52.214-7 or 52.215-1. All offers are subject to all terms and conditions contained in this solicitation.

10. FOR INFORMATION CALL:	A. NAME	B. TELEPHONE (NO COLLECT CALLS) AREA CODE	NUMBER	EXT.	C. E-MAIL ADDRESS
	Labreesha B. Batey	256	544-6085		labreesha.b.batey@nasa.gov

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(X)	SEC.	DESCRIPTION	PAGE(S)	(X)	SEC.	DESCRIPTION	PAGE(S)
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OFFER *(Must be fully completed by offeror)*

NOTE: Item 12 does not apply if the solicitation includes the provisions at 52.214-16, Minimum Bid Acceptance Period.

12. In compliance with the above, the undersigned agrees, if this offer is accepted within _____ calendar days (60 calendar days unless a different period is inserted by the offeror) from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified in the schedule.

13. DISCOUNT FOR PROMPT PAYMENT *(See Section I, Clause No. 52.232.8)*	10 CALENDAR DAYS (%)	20 CALENDAR DAYS (%)	30 CALENDAR DAYS (%)	CALENDAR DAYS (%)

14. ACKNOWLEDGEMENT OF AMENDMENTS *(The offeror acknowledges receipt of amendments to the SOLICITATION for offerors and related documents numbered and dated):*	AMENDMENT NO.	DATE	AMENDMENT NO.	DATE

15A. NAME AND ADDRESS OF OFFEROR	CODE	FACILITY	16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*

15B. TELEPHONE NUMBER AREA CODE	NUMBER	EXT.	15C. CHECK IF REMITTANCE ADDRESS ☐ IS DIFFERENT FROM ABOVE - ENTER SUCH ADDRESS IN SCHEDULE.	17. SIGNATURE	18. OFFER DATE

AWARD *(To be completed by government)*

19. ACCEPTED AS TO ITEMS NUMBERED	20. AMOUNT	21. ACCOUNTING AND APPROPRIATION

22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: ☐ 10 U.S.C. 2304 (c) ( ) ☐ 41 U.S.C. 253 (c) ( )	23. SUBMIT INVOICES TO ADDRESS SHOWN IN *(4 copies unless otherwise specified)*	ITEM

24. ADMINISTERED BY *(If other than Item 7)*	CODE	25. PAYMENT WILL BE MADE BY	CODE

26. NAME OF CONTRACTING OFFICER *(Type or print)*	27. UNITED STATES OF AMERICA *(Signature of Contracting Officer)*	28. AWARD DATE
Belinda F Triplett		

IMPORTANT - Award will be made on this Form, or on Standard Form 26, or by other authorized official written notice.

AUTHORIZED FOR LOCAL REPRODUCTION
Previous edition is unusable

STANDARD FORM 33 (Rev. 9-97)
Prescribed by GSA - FAR (48 CFR) 53.214(c)

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED NNM15536283R	PAGE 2 OF 2

NAME OF OFFEROR OR CONTRACTOR

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	INCO TERMS 2: Destination				

ATTACHMENT 1
SECTION A

OMB Approval 2700-0085

AWARD/CONTRACT FORM

DETAILED TABLE OF CONTENTS PAGE

PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACHMENTS

SECTION J – LIST OF ATTACHMENTS

J-1 STATEMENT OF WORK (SOW)

J-1(a) SLS-SPIE-RQMT-020, SPACECRAFT PAYLOAD INTEGRATION AND EVOLUTION OFFICE SECONDARY PAYLOAD DEPLOYMENT SYSTEM AVIONICS REQUIREMENTS.

J-2 DATA PROCUREMENT DOCUMENT (DPD)

J-3 SUBCONTRACTING PLAN

J-4 SAFETY, HEALTH, AND ENVIRONMENTAL (SHE) PLAN

J-5 APPLICABLE DOCUMENTS

[END OF SECTION]

SECTION B - SUPPLIES OR SERVICES AND PRICES

B.1 1852.216-78 FIRM FIXED PRICE (DEC 1988)

The total firm fixed price of this contract is $ TBD.

(End of clause)

B.2 SUPPLIES AND/OR SERVICES TO BE PROVIDED

The Contractor shall provide all resources necessary to deliver and/or perform the items below in accordance with the Statement of Work incorporated in Sections A through J, inclusive.

Contract Value

CLIN	Description	Quantity	Unit	Total Amount	Delivery Date
001	Qualification Unit*	1	Each	$TBD	06/01/2016
002	Ground Support Equipment	1	Each	$TBD	09/30/2016
003	Flight Unit*	1	Each	$TBD	09/30/2016
004	Reporting and Project Management	NA		$TBD	Various
	Total			$TBD	

(End of provision)

* May include any non-flight hardware/temporary installations as applicable

B.3 1852.232-77 LIMITATION OF FUNDS (FIXED PRICE CONTRACT) (MARCH 1989)

(a) Of the total contract, the sum of $ TBD is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the Contract until the total price or estimated cost under the ceiling is allotted.

Contract Obligated Funds

CLIN	Description	Total Obligated Funds
001	Qualification Unit	$TBD
002	Ground Support Equipment	$TBD
003	Flight Unit	$TBD
004	Reporting and Project Management	$TBD
	Total	$TBD

It is anticipated CLIN 004 funds will be allocated to the contract in accordance with the following schedule:

Event No	Event	Method of Verification	Estimated Completion Date	Total
1	Completion of Kick off Meeting and Briefing Package	Performance of meeting submission of briefing package	August 10, 2015	% of CLIN 004
2	Completion of Critical Design Review Data Package	Performance of review and submission of DRD MA-004	January 14, 2016	% of CLIN 004
3	Completion of Qualification Unit Delivery Review	Performance of review and submission of DRD MA-004	June 1, 2016	% of CLIN 004
4	Completion of Acceptance Review Data Package	Performance of review and submission of DRD MA-004	September 30, 2016	% of CLIN 004
5	Remainder of required reports	Various	Various	% of CLIN 004

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) of this clause up to the point at which, if this contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause would, in the exercise of reasonable judgment by the Contractor, approximate the total amount at the time allotted to the contract. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in the Termination for Convenience of the Government clause notwithstanding.

(c) (1) It is contemplated that funds presently allotted to this contract will cover the work to be performed until TBD.

(2) If funds allotted are considered by the Contractor to be inadequate to cover the work to be performed until that date, or an agreed date substituted for it, the Contractor shall notify the Contracting Officer in writing when within the next 60 days the work will reach a point at which, if the contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause will approximate 75 percent of the total amount then allotted to the contract.

(3) (i) The notice shall state the estimate when the point referred to in paragraph (c)(2) of this clause will be reached and the estimated amount of additional funds required to continue performance to the date specified in paragraph (c)(1) of this clause, or an agreed date substituted for it.

(ii) The Contractor shall, 60 days in advance of the date specified in paragraph (c)(1) of this clause, or an agreed date substituted for it, advise the Contracting Officer in writing as to the estimated amount of additional funds required for the timely performance of the contract for a further period as may be specified in the contract or otherwise agreed to by the parties.

(4) If, after the notification referred to in paragraph (c)(3)(ii) of this clause, additional funds are not allotted by the date specified in paragraph (c)(1) of this clause, or an agreed date substituted for it, the Contracting Officer shall, upon the Contractor's written request, terminate this contract on that date or on the date set forth in the request, whichever is later, pursuant to the Termination for Convenience of the Government clause.

(d) When additional funds are allotted from time to time for continued performance of the work under this contract, the parties shall agree on the applicable period of contract performance to be covered by these funds. The provisions of paragraphs (b) and (c) of this clause shall apply to these additional allotted funds and the substituted date pertaining to them, and the contract shall be modified accordingly.

(e) If, solely by reason of the Government's failure to allot additional funds in amounts sufficient for the timely performance of this contract, the Contractor incurs additional costs or is delayed in the performance of the work under this contract, and if additional funds are allotted, an equitable adjustment shall be made in the price or prices (including appropriate target, billing, and ceiling prices where applicable) of the items to be delivered, or in the time of delivery, or both.

(f) The Government may at any time before termination, and, with the consent of the Contractor, after notice of termination, allot additional funds for this contract.

(g) The provisions of this clause with respect to termination shall in no way be deemed to limit the rights of the Government under the default clause of this contract. The provisions of this Limitation of Funds clause are limited to the work on and allotment of funds for the items set forth in paragraph (a) of this clause. This clause shall become inoperative upon the allotment of funds for the total price of said work except for rights and obligations then existing under this clause.

(h) Nothing in this clause shall affect the right of the Government to terminate this contract pursuant to the Termination for Convenience of the Government clause of this contract.

(End of clause)

[END OF SECTION]

SECTION C - DESCRIPTION/SPECIFICATIONS/STATEMENT OF WORK

C.1 MSFC 52.211-93 DESCRIPTION/SPECIFICATIONS/STATEMENT OF WORK (FEB 2001)

See page J-1 for statement of work and associated J attachments

(End of provision)

[END OF SECTION]

SECTION D - PACKAGING AND MARKING

D.1 CLAUSES INCORPORATED BY REFERENCE

The following clauses are incorporated by reference, with the same force and effect as if they were given in full text. Clauses incorporated by reference which require a fill-in by the Government include the text of the affected paragraph(s) only. This does not limit the clause to the affected paragraph(s). The Contractor is responsible for understanding and complying with the entire clause. The full text of the clause is available at the addresses contained in clause 52.252-2, Clauses Incorporated by Reference, of this contract.

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

None included by reference.

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18)

CLAUSE NO.	TITLE	DATE
1852.211-70	Packaging, Handling, And Transportation	SEPT 2005

(End of clause)

[END OF SECTION]

SECTION E - INSPECTION AND ACCEPTANCE

E.1 CLAUSES INCORPORATED BY REFERENCE

The following clauses are incorporated by reference, with the same force and effect as if they were given in full text. Clauses incorporated by reference which require a fill-in by the Government include the text of the affected paragraph(s) only. This does not limit the clause to the affected paragraph(s). The Contractor is responsible for understanding and complying with the entire clause. The full text of the clause is available at the addresses contained in clause 52.252-2, Clauses Incorporated by Reference, of this contract.

I. FEDERAL ACQUISITION REGULATION CLAUSES (FAR) (48 CFR Chapter 1)

CLAUSE NO.	TITLE	DATE
52.246-2	Inspection of Supplies – Fixed Price	AUG 1996
52.246-7	Inspection Of Research And Development – Fixed Price	AUG 1996
52.246-15	Certificate Of Conformance	APR 1984
52.246-16	Responsibility For Supplies	APR 1984

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18)

None included by reference.

(End of clause)

E.2 52.246-11 HIGHER-LEVEL CONTRACT QUALITY REQUIREMENT (FEB 1999)

The Contractor shall comply with the higher-level quality standard selected below:

TITLE	NUMBER	DATE
Aerospace Standard	AS9100C	2009-1

E.3 1852.246-72 MATERIAL INSPECTION AND RECEIVING REPORT (AUG 2003)

(a) At the time of each delivery to the Government under this contract, the Contractor shall furnish a Material Inspection and Receiving Report (DD Form 250 series) as follows:

Distribution	No Copies
Contracting Officer	1
SLS Secondary Payload Project Manager	1
Attached to shipment (on Box #1)	4

(b) The Contractor shall prepare the DD Form 250 in accordance with NASA FAR Supplement 1846.6. The Contractor shall enclose the copies of the DD Form 250 in the package or seal them in a waterproof envelope, which shall be securely attached to the exterior of the package in the most protected location.

(c) When more than one package is involved in a shipment, the Contractor shall list on the DD Form 250, as additional information, the quantity of packages and the package numbers. The Contractor shall forward the DD Form 250 with the lowest numbered package of the shipment and print the words "CONTAINS DD FORM 250" on the package.

(d) NASA Quality Assurance Reviewing and Inspection applies to this order. Quality Inspection shall consist of count and condition in accordance with the associated DD250 and Performance Statement of Work/DRD.

E.4 1852.246-73 HUMAN SPACE FLIGHT ITEM (MARCH 1997)
The Contractor shall include the following statement in all subcontracts and purchase orders placed by it in support of this contract, without exception as to amount or subcontract level:

"FOR USE IN HUMAN SPACE FLIGHT; MATERIALS, MANUFACTURING, AND WORKMANSHIP OF HIGHEST QUALITY STANDARDS ARE ESSENTIAL TO ASTRONAUT SAFETY.

IF YOU ARE ABLE TO SUPPLY THE DESIRED ITEM WITH A HIGHER QUALITY THAN THAT OF THE ITEMS SPECIFIED OR PROPOSED, YOU ARE REQUESTED TO BRING THIS FACT TO THE IMMEDIATE ATTENTION OF THE PURCHASER."

(End of clause)
[END OF SECTION]

SECTION F - DELIVERIES OR PERFORMANCE

F.1 CLAUSES INCORPORATED BY REFERENCE

The following clauses are incorporated by reference, with the same force and effect as if they were given in full text. Clauses incorporated by reference which require a fill-in by the Government include the text of the affected paragraph(s) only. This does not limit the clause to the affected paragraph(s). The Contractor is responsible for understanding and complying with the entire clause. The full text of the clause is available at the addresses contained in clause 52.252-2, Clauses Incorporated by Reference, of this contract.

I. FEDERAL ACQUISITION REGULATION CLAUSES (FAR) (48 CFR Chapter 1)

CLAUSE NO.	TITLE	DATE
52.242-15	Stop-Work Order	AUG 1989
52.242-17	Government Delay Of Work	APR 1984
52.247-34	F.O.B. Destination	NOV 1991

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18)

None included by reference.

(End of clause)

F.2 1852.247-72 ADVANCE NOTICE OF SHIPMENT (OCT 1988)

Ten (10) work days prior to shipping item(s) 001, 002, and 003 under Contract Section B.2 Deliverables, the Contractor shall furnish the anticipated shipment date, bill of lading number (if applicable), and carrier identity to SLS Secondary Payload Project Manager and to the Contracting Officer.

(End of clause)

F.3 PERIOD OF PERFORMANCE

The period of performance of this contract is estimated to be 18 months from the effective date of the contract.

(End of clause)

F.4 DELIVERY SCHEDULE

Deliverable Description	Delivery Date
Kick off Meeting and Briefing Package	8/10/2015
Critical Design Review/DRD 1537 MA-004	1/14/2016
Qualification Unit Review/DRD 1537 MA-004	6/1/2016
Qualification Unit	6/1/2016
Ground Support Equipment	9/30/2016
Acceptance Data Review/DRD MA-004	9/30/2016
Flight Unit	9/30/2016
Final Scientific and Technical Report/DRD MA-001	Per DRD Submission Requirements
Monthly Status Reports/DRD MA-002 and MA-003	Per DRD Submission Requirements
Safety and Health Plan/DRD SA-002	Per DRD Submission Requirements
Off-site Mishap and Safety Statistics Report/DRD SA-003	Per DRD Submission Requirements
Technology Report/DRD CD-001	Per DRD Submission Requirements
Hardware/Data Shortage	As requested by MSFC Technical Lead
Battery Data Report	As requested by MSFC Technical Lead

(End of clause)

F.5 DELIVERY INSTRUCTIONS

(a) The Contractor shall ship the items required under this contract to:

Qualification Unit and Ground Support Equipment:
NASA/Marshall Space Flight Center
AS40/Central Receiving Building 4631
Huntsville, AL 35812
Marked for Consignee: George Norris, SLS Secondary Payload Project Manager
Phone: 256-544-2345
Organization/Office Code: ES62/Building No.: 4755 North Bay

Flight Unit:
NASA/Marshall Space Flight Center
AS40/Central Receiving Building 4631
Huntsville, AL 35812
Marked for Consignee: George Norris, SLS Secondary Payload Project Manager
Phone: 256-544-2345
Organization/Office Code: ES62/Building No.: 4755 North Bay

Critical Design Review, Qualification Review and Acceptance Review Reports:
George Norris, SLS Secondary Payload Project Manager
NASA/Marshall Space Flight Center
ES62 Bldg. 4755/403-C
Huntsville, AL 35812

(b) Unless otherwise authorized in advance by the Contracting Officer, deliveries under this contract shall be made between the hours of 8 a.m. and 4:30 p.m., Monday through Friday, excluding Federal holidays.

(End of clause)

[END OF SECTION]

SECTION G - CONTRACT ADMINISTRATION DATA

G.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

The following clauses are incorporated by reference, with the same force and effect as if they were given in full text. Clauses incorporated by reference which require a fill-in by the Government include the text of the affected paragraph(s) only. This does not limit the clause to the affected paragraph(s). The Contractor is responsible for understanding and complying with the entire clause. The full text of the clause is available at the addresses contained in clause 52.252-2, Clauses Incorporated by Reference, of this contract.

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

None included by reference.

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18)

CLAUSE NO.	TITLE	DATE
1852.227-70	New Technology	MAY 2002

(End of clause)

G.2 1852.227-72 DESIGNATION OF NEW TECHNOLOGY REPRESENTATIVE AND PATENT REPRESENTATIVE (JUL 1997)

(a) For purposes of administration of the clause of this contract entitled New Technology or Patent Rights - Retention by the Contractor (Short Form), whichever is included, the following named representatives are hereby designated by the Contracting Officer to administer such clause:

New Technology Representative:
Carolyn McMillan, 256-544-9151
ED03/NASA/MSFC
MSFC, AL 35812

Patent Representative:
James McGroary, 256-544-0013
LS01/NASA/MSFC
MSFC, AL 35812

(b) Reports of reportable items, and disclosure of subject inventions, interim reports, final reports, utilization reports, and other reports required by the clause, as well as any correspondence with respect to such matters, should be directed to the New Technology Representative unless transmitted in response to correspondence or request from the Patent Representative. Inquires or requests regarding disposition of rights, election of rights, or related matters should be directed to the Patent Representative. This clause shall be included in any subcontract hereunder requiring a New Technology clause or Patent Rights - Retention by the Contractor (Short Form) clause, unless otherwise authorized or directed by the Contracting Officer. The respective responsibilities and authorities of the above-named representatives are set forth in 1827.305-370 of the NASA FAR Supplement.

(End of clause)

G.3 SUBMISSION OF INVOICES FOR PAYMENT

(a) Payments under this contract will be made by the office shown on the contract cover page. Payments may be invoiced as follows:

Note: *Payment will be withheld if the required deliverables in Section B have not been received or if the reports do not indicate that appropriate progress has been made.
**Final payment shall not be submitted until contractor has received written approval from the CO that all contract requirements have been accepted.

(b) The Contractor shall submit invoices as follows:

(1) The original of all invoices, with the exception of the final invoice, shall be sent directly to the payment office designated on the contract cover page at the address listed below. The last invoice, clearly marked "FINAL" on its face, shall be sent to the Contract Administration official designated on the contract cover page who will coordinate review and approval with the NASA Contracting Officer and assure transmission to the payment office once a determination has been made that all requirements of the contract have been met.

(2) The Contractor shall mark invoice copies with the name and address of the following parties to facilitate distribution of paid copies by the payment office. Send original copy to:

NASA/Shared Services Center
Financial Management Division (FMD) – Accounts Payable
Building 1111, C Road
NSSC-AccountsPayable@nasa.gov
Stennis Space Center, MS 39529-6000

A copy of the invoice shall be submitted to the Contracting Officer. The Contracting Officer may designate other recipients as required.

(3) All invoices shall reference the contract number.

(End of clause)

[END OF SECTION]

SECTION H - SPECIAL CONTRACT REQUIREMENTS

H.1 CLAUSES INCORPORATED BY REFERENCE

The following clauses are incorporated by reference, with the same force and effect as if they were given in full text. Clauses incorporated by reference which require a fill-in by the Government include the text of the affected paragraph(s) only. This does not limit the clause to the affected paragraph(s). The Contractor is responsible for understanding and complying with the entire clause. The full text of the clause is available at the addresses contained in clause 52.252-2, Clauses Incorporated by Reference, of this contract.

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

None included by reference.

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18)

CLAUSE NO.	TITLE	DATE
1852.208-81	Restrictions On Printing And Duplicating	NOV 2004
1852.223-72	Safety And Health (Short Form)	APR 2002
1852.223-75	Major Breach Of Safety Or Security	FEB 2002
1852.235-73	Final Scientific And Technical Reports	DEC 2006

(End of Clause)

H.2 1852.225-70 EXPORT LICENSES (FEB 2000)

(a) The Contractor shall comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data, and software, or for the provision of technical assistance.

(b) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at *MSFC*, where the foreign person will have access to export-controlled technical data or software.

(c) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(d) The Contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.

(End of clause)

H.3 1852.242-72 OBSERVANCE OF LEGAL HOLIDAYS (AUG 1992) – Alternate I (SEP 1989) – Alternate II (OCT 2000) appropriately modified for Fixed Price contracts.

(Applies only to work performed at Government facilities.)

(a) The on-site Government personnel observe the following holidays:

New Year's Day
Labor Day
Martin Luther King, Jr.'s Birthday
Columbus Day
President's Day
Veterans Day
Memorial Day
Thanksgiving Day
Independence Day
Christmas Day
Any other day designated by Federal statute, Executive order, or the President's proclamation.

(b) When any holiday falls on a Saturday, the preceding Friday is observed. When any holiday falls on a Sunday, the following Monday is observed. Observance of such days by Government personnel shall not by itself be cause for an additional period of performance or entitlement of compensation except as set forth within the contract.

(c) On-site personnel assigned to this contract shall not be granted access to the installation during the holidays in paragraph (a) of the clause, except as follows: the Contractor shall provide sufficient on-site personnel to perform round-the-clock requirements of critical work already in process, unless otherwise instructed by the Contracting Officer or authorized representative. If the Contractor's on-site personnel work during a holiday other than those in paragraph (a) of this clause, no form of holiday or other premium compensation shall be reimbursed as either a direct or indirect cost. However, this does not preclude reimbursement for authorized overtime work that would have been overtime regardless of the status of the day as a holiday.

(d) The Contractor shall place identical requirements, including this paragraph, in all subcontracts that require performance of work on-site, unless otherwise instructed by the Contracting Officer.

(e) When the NASA installation grants administrative leave to its Government employees (e.g., as a result of inclement weather, potentially hazardous conditions, or other special circumstances), Contractor personnel working on-site should also be dismissed.

(f) However, the contractor shall provide sufficient on-site personnel to perform round-the-clock requirements of critical work already in process, unless otherwise instructed by the Contracting Officer or authorized representative.

(g) Unless prior written notice is provided by the Contracting Officer, if the Contractor grants commensurate administrative leave to Contractor personnel, consistent with paragraph c of this clause, there will be no deduction to the fixed price of the contract as long as contractor personnel are paid for this time period. The contractor shall not be entitled to an equitable adjustment to the contract value, pursuant to any other clause of this contract, associated with payment of such administrative leave.

(End of Clause)

[END OF SECTION]

SECTION I - CONTRACT CLAUSES

I.1 52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates on or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also the full text of a clause may be accessed electronically at these addresses.

FAR Clauses: Hhttp://www.acquisition.gov/far/
NASA FAR Supplement clauses: http://www.hq.nasa.gov/office/preocurement/regs/nfstoc.htm
MSFC Clauses: The MSFC center unique clauses can be found on the MSFC Doing Business website https://ec.msfc.nasa.gov/doing_business/ under the Rules and Regulations menu item.

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	TITLE	DATE
52.202-1	DEFINITIONS	NOV 2013
52.203-3	GRATUITIES	APR 1984
52.203-5	COVENANT AGAINST CONTINGENT FEES	MAY 2014
52.203-7	ANTI-KICKBACK PROCEDURES	MAY 2014
52.203-8	CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY	MAY 2014
52.203-10	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY	MAY 2014
52.203-12	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS	OCT 2010
52.203-13	CONTRACTOR CODE OF BUSINESS ETHICS AND CONDUCT	APR 2010
52.203-17	CONTRACTOR EMPLOYEE WHISTLEBLOWER RIGHTS AND REQUIREMENT TO INFORM EMPLOYEES OF WHISTLEBLOWER RIGHTS	APR 2014
52.204-4	PRINTED OR COPIED DOUBLE-SIDED ON POSTCONSUMER FIBER CONTENT PAPER	MAY 2011

52.204-10	REPORTING EXECUTIVE COMPENSATION AND FIRST-TIER SUBCONTRACT AWARDS	JUL 2013
52.204-13	SYSTEM FOR AWARD MANAGEMENT MAINTENANCE	JUL 2013
52.204-16	COMMERICAL AND GOVERNMENT ENTITY CODE REPORTING	NOV 2014
52.204-18	COMMERICAL AND GOVERNMENT ENTITY CODE MAINTENANCE	NOV 2014
52.209-6	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT	AUG 2013
52.209-10	PROHIBITION ON CONTRACTING WITH INVERTED DOMESTIC CORPORATIONS	MAY 2012
52.211-5	MATERIAL REQUIREMENTS	AUG 2000
52.211-15	DEFENSE PRIORITY AND ALLOCATION REQUIREMENTS	APR 2008
52.215-2	AUDIT AND RECORDS – NEGOTIATIONS	OCT 2010
52.215-8	ORDER OF PRECEDENCE - UNIFORM CONTRACT FORMAT	OCT 1997
52.215-11	PRICE REDUCTION FOR DEFECTIVE CERTIFIED COST OR PRICING DATA – MODIFICATIONS	AUG 2011
52.215-13	SUBCONTRACTOR CERTIFIED COST OR PRICING DATA – MODIFICATIONS	OCT 2010
52.215-19	NOTIFICAITON OF OWNERSHIP CHANGES	OCT 1997
52.215-21	REQUIREMENTS FOR CERTIFIED COST OR PRICING DATA OR DATA OTHER THAN COST OR PRICING DATA - MODIFICATIONS	OCT 2010
52.219-8	UTILIZATION OF SMALL BUSINESS CONCERNS	OCT 2014
52.219-9	SMALL BUSINESS SUBCONTRACTING PLAN	OCT 2014

52.219-16	LIQUIDATED DAMAGES – SUBCONTRACTING PLAN	JAN 1999
52.222-3	CONVICT LABOR	JUN 2003
52.222-21	PROHIBITION OF SEGREGATED FACILITIES	FEB 1999
52.222-26	EQUAL OPPORTUNITY	MAR 2007
52.222-35	EQUAL OPPORTUNITY FOR VETERANS	JUL 2014
52.222-36	EQUAL OPPORTUNITY FOR WORKERS WITH DISABILITIES	JUL 2014
52.222-37	EMPLOYMENT REPORTS ON VETERANS	JUL 2014
52.222-40	NOTIFICATION OF EMPLOYEE RIGHTS UNDER THE NATIONAL LABOR RELATIONS ACT	DEC 2010
52.222-50	COMBAT TRAFFICKING IN PERSONS	MAR 2015
52.222-54	EMPLOYMENT ELIGIBILITY VERIFICATON	FEB 1999
52.223-6	DRUG-FREE WORKPLACE	MAY 2001
52.223-18	ENCOURAGING CONTRACTOR POLICIES TO BAN TEXT MESSAGING WHILE DRIVING	AUG 2011
52.225-13	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES	JUN 2008
52.225-25	PROHIBITION ON ENGAGING IN SANCTIONED ACTIVITIES RELATING TO IRAN-CERTIFICATION	SEP 2012
52.227-1	AUTHORIZATION AND CONSENT (ALT 1)	DEC 2007
52.227-11	PATENTS RIGHTS-OWNERSHIP BY THE CONTRACTOR	MAY 2014
52.227-14	RIGHTS IN DATA – GENERAL ALTERNATE II	MAY 2014 DEC 2007

Insert the following in paragraph (g)(3) of the Limited Rights Notice:
(i) Use (except for manufacture) by support service contractors.
(ii) Evaluation by nongovernment evaluators.
(iii) Use (except for manufacture) by other contractors participating in the Government's program of which the specific contract is a part.

52.227-16	ADDITIONAL DATA REQUIREMENTS	JUN 1987
52.229-3	FEDERAL, STATE, AND LOCAL TAXES	FEB 2013
52.230-2	COST ACCOUNTING STANDARDS	MAY 2014
52.232-2	PAYMENTS UNDER FIXED-PRICE RESEARCH AND DEVELOPMENT CONTRACTS	APR 1984
52.232-9	LIMITATION ON WITHHOLDING OF PAYMENTS	APR 1984
52.232-17	INTEREST	MAY 2014
52.232-23	ASSIGNMENT OF CLAIMS	MAY 2014
52.232-25	PROMPT PAYMENT	JUL 2013
52.232-33	PAYMENT BY ELECTRONIC FUNDS TRANSFER -- SYSTEM FOR AWARD MANAGEMENT	JUL 2013
52.232-39	UNENFORCEABILITY OF UNAUTHORIZED OBLIGATIONS	JUN 2013
52.232-40	PROVIDING ACCELERATED PAYMENT TO SMALL BUSINESS SUBCONTRACTORS	DEC 2013
52.233-1	DISPUTES ALTERNATE I	MAY 2014 DEC 1991
52.233-3	PROTEST AFTER AWARD	AUG 1996
52.233-4	APPLICABLE LAW FOR BREACH OF CONTRACT CLAIM	OCT 2004
52.242-13	BANKRUPTCY	JUL 1995
52.243-1	CHANGES - FIXED-PRICE	AUG 1987
52.244-6	SUBCONTRACTS FOR COMMERCIAL ITEMS	MAR 2015
52.246-23	LIMITATION OF LIABILITY	FEB 1997
52.248-1	VALUE ENGINEERING	OCT 2010
52.249-2	TERMINATION FOR CONVENIENCE OF THE GOVMENT (FIXED-PRICE)	APR 2012

52.249-9	DEFAULT (FIXED-PRICE RESEARCH AND DEVELOPMENT)	APR 1984
52.251-1	GOVERNMENT SUPPLY SOURCES	APR 2012
52.253-1	COMPUTER GENERATED FORMS	JAN 1991

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18)

1852.204-76	SECURITY REQUIREMENTS FOR UNCLASSIFIED INFORMATION TECHNOLOGY RESOURCES	JAN 2011
1852.219-74	USE OF RURAL AREA SMALL BUSINESSES	SEP 1990
1852.219-75	SMALL BUSINESS SUBCONTRACTING REPORTING	MAY 1999
1852.219-76	NASA 8 PERCENT GOAL	JUL 1997
1852.227-11	PATENT RIGHTS—RETENTION BY THE CONTRACTOR (SHORT FORM) **MODIFIES FAR CLAUSE 52.227-11**	
1852.227-14	RIGHTS IN DATA - GENERAL	
1852.235-70	CENTER FOR AEROSPACE INFORMATION	DEC 2006
1852.237-72	ACCESS TO SENSITIVE INFORMATION	JUNE 2005
1852.237-73	RELEASE OF SENSITIVE INFORMATION	JUNE 2005

(End of clause)

I.2 52.209-9 UPDATES OF PUBLICLY AVAILABLE INFORMATION REGARDING RESPONSIBILITY MATTERS (JUL 2013)

(a) The Contractor shall update the information in the Federal Awardee Performance and Integrity Information System (FAPIIS) on a semi-annual basis, throughout the life of the contract, by posting the required information in the System for Award Management database via https://www.acquisition.gov.

(b) As required by section 3010 of the Supplemental Appropriations Act, 2010 (Pub. L. 111-212), all information posted in FAPIIS on or after April 15, 2011, except past performance reviews, will be publicly available. FAPIIS consists of two segments—

(1) The non-public segment, into which Government officials and the Contractor post information, which can only be viewed by—

(i) Government personnel and authorized users performing business on behalf of the Government; or

(ii) The Contractor, when viewing data on itself; and

(2) The publicly-available segment, to which all data in the non-public segment of FAPIIS is automatically transferred after a waiting period of 14 calendar days, except for—

(i) Past performance reviews required by subpart 42.15;

(ii) Information that was entered prior to April 15, 2011; or

(iii) Information that is withdrawn during the 14-calendar-day waiting period by the Government official who posted it in accordance with paragraph (c)(1) of this clause.

(c) The Contractor will receive notification when the Government posts new information to the Contractor's record.

(1) If the Contractor asserts in writing within 7 calendar days, to the Government official who posted the information, that some of the information posted to the non-public segment of FAPIIS is covered by a disclosure exemption under the Freedom of Information Act, the Government official who posted the information must within 7 calendar days remove the posting from FAPIIS and resolve the issue in accordance with agency Freedom of Information procedures, prior to reposting the releasable information. The contractor must cite 52.209-9 and request removal within 7 calendar days of the posting to FAPIIS.

(2) The Contractor will also have an opportunity to post comments regarding information that has been posted by the Government. The comments will be retained as long as the associated information is retained, i.e., for a total period of 6 years. Contractor comments will remain a part of the record unless the Contractor revises them.

(3) As required by section 3010 of Pub. L. 111-212, all information posted in FAPIIS on or after April 15, 2011, except past performance reviews, will be publicly available.

(d) Public requests for system information posted prior to April 15, 2011, will be handled under Freedom of Information Act procedures, including, where appropriate, procedures promulgated under E.O. 12600.

(End of clause)

I.3 52.252-6 AUTHORIZED DEVIATIONS IN CLAUSES (APR 1984)
(a) The use in this solicitation or contract of nay Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.

(b) The use in this solicitation or contract of any NASA FAR Supplement clause with an authorized deviation is indicated by the addition of "(DEVIATION)" afther the name of the regulation.

(End of Clause)

I.4 1852.215-84 OMBUDSMAN (NOV 2011)
(a) An ombudsman has been appointed to hear and facilitate the resolution of concerns from offerors, potential offerors, and contractors during the preaward and postaward phases of this acquisition. When requested, the ombudsman will maintain strict confidentiality as to the source of the concern. The existence of the ombudsman is not to diminish the authority of the contracting officer, the Source Evaluation Board, or the selection official. Further, the ombudsman does not participate in the evaluation of proposals, the source selection process, or the adjudication of formal contract disputes. Therefore, before consulting with an ombudsman, interested parties must first address their concerns, issues, disagreements, and/or recommendations to the contracting officer for resolution.

(b) If resolution cannot be made by the contracting officer, interested parties may contact the installation ombudsman, whose name, address, telephone number, facsimile number, and e-mail address may be found at: http://prod.nais.nasa.gov/pub/pub_library/Omb.html. Concerns, issues, disagreements, and recommendations which cannot be resolved at the installation may be referred to the Agency ombudsman identified at the above URL. Please do not contact the ombudsman to request copies of the solicitation, verify offer due date, or clarify technical requirements. Such inquiries shall be directed to the Contracting Officer or as specified elsewhere in this document.

(End of clause)

I.5 1852.225-71 RESTRICTION ON FUNDING ACTIVITY WITH CHINA (FEB 2012)
(a) Definition - "China" or "Chinese-owned company" means the People's Republic of China, any company owned by the People's Republic of China or any company incorporated under the laws of the People's Republic of China.
(b) Public Laws 112-10, Section 1340(a) and 112-55, Section 539, restrict NASA from contracting to participate, collaborate, coordinate bilaterally in any way with China or a Chinese-owned company using funds appropriated on or after April 25, 2011. Contracts for commercial and non developmental items are exempted from the prohibition because they constitute purchase of goods or services that would not involve participation, collaboration, or coordination between the parties.

(c) This contract may use restricted funding that was appropriated on or after April 25, 2011. The contractor shall not contract with China or Chinese-owned companies for any effort related to this contract except for acquisition of commercial and non-developmental items. If the contractor anticipates making an award to China or Chinese-owned companies, the contractor must contact the contracting officer to determine if funding on this contract can be used for that purpose.

(d) Subcontracts - The contractor shall include the substance of this clause in all subcontracts made hereunder.

(End of clause)

[END OF SECTION]

SECTION J - LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS

J.1 LIST OF ATTACHMENTS

The following documents are attached hereto and made a part of this contract:

Attachment Number	Document Description	Number of Pages
J-1	Statement of Work	7
J-1(a)	SLS-SPIE-RQMT-020, Spacecraft Payload Integration and Evolution Office Secondary Payload Deployment System Avionics Requirements and Addendum	55
J-2	Data Procurement Document	61
J-3	Subcontracting Plan	TBD
J-4	Safety, Health and Environment Plan	TBD
J-5	Applicable Documents	2

ATTACHMENT J-1
STATEMENT OF WORK

Attachment J-1

Statement of Work
For
Secondary Payloads Avionics Box Development

1. Introduction

The Marshall Space Flight Center (MSFC) is in need of a self-contained flight qualified avionics box which will control the deployment of Secondary Payloads on the Space Launch System (SLS) Exploration Mission 1 (EM-1) from the Multi-Purpose Crew Vehicle (MPCV) Stage Adapter (MSA). The SLS Secondary Payload Deployment System (SPDS) Avionics System (i.e., avionics box) will contain a sequencer capable of storing and executing multiple deployment scenarios, and a battery to supply power to the deployment system for the duration of the mission objectives.

The function of the sequencer is to receive a trigger signal from the SLS second stage, initiate counting to each payload deployment, and send the deployment signal/power to that specific payload dispenser to open its door to allow jettison of the payload per the sequencer's resident skit. The sequencer receives its power from the deployment system's battery during the mission.

The function of the battery is to provide power to the system's sequencer for its deployment timing operation, and power for the activation and operation for a minimum of eleven and maximum of seventeen dispensers. The battery will be co-located with the sequencer and can be physically combined with the sequencer. The battery will receive trickle charge power from the ground while in the Vehicle Assembly Building only via drag-on cabling.

Two avionics boxes shall be delivered as part of this procurement, a Qualification Unit and a Flight Unit. Ground Support Equipment (GSE) necessary to support the loading and testing of the required multiple deployment scenarios and any Non-flight Hardware/Temporary Installations shall also be provided by this procurement.

2. Program Management

The Contractor shall report and document this work and fulfill the requirements of associated Data Requirement Descriptions (DRDs) as outlined in Data Procurement Document (DPD) 1537 (Attachment J-2). The contractor shall determine the data restriction that applies to each data deliverable and mark or transmit the data restriction in accordance with Section 2.3.3 of the Data Procurement Document.

The Contractor shall provide technical information concerning any invention, discovery, improvement, or innovation made by the contractor in the performance of work under this contract. Technology Reports shall be prepared in accordance with DRD 1537CD-001.

The Contractor shall prepare and submit a Final Scientific and Technical Report that complies with the requirements of NFS 1852.235-73 in accordance with DRD 1537MA-001.

2.1 Reviews

Several reviews and meetings have been established to facilitate the progress of the avionics box design and manufacturing. Manpower, facilities, and data shall be prepared to support the formal reviews required within this scope of work. Data required for each review shall be delivered in accordance with DRD 1537MA-004, "Major Review Documentation documents the deliverables at the Critical Design Review (CDR), Qualification Unit Delivery Review (QUDR), and Acceptance Review (AR). In addition, DRD 1537MA-004, lists all the required deliverables that are not listed directly in the Statement of Work.

2.1.1 Kickoff Meeting

The Kickoff Meeting will ensure that the SPDS Avionics System requirements, as specified in SLS-SPIE-RQMT-020 as amended, Secondary Payloads Deployment System Avionics Requirements Document, are properly formulated and correlated with the procurement deliverables as described in this Statement of Work (SOW). The Contractor shall describe the SOW and how all work will be planned to effectively accomplish the deliverables. All applicable Contractor processes, such as systems engineering and technical/schedule management, shall be addressed. The Kickoff review will be held by teleconference and is expected to last up to one half day.

2.1.2 Critical Design Review

The CDR will ensure that the SPDS Avionics System design has met all of its requirements before hardware manufacturing commences. The Contractor shall design an avionics box (which includes a sequencer and battery) that meets the specifications called out in SLS-SPIE-RQMT-020. The Contractor shall demonstrate how the design meets the technical requirements and delivers all the documentation specified in accordance with DRD 1537MA-004 for this review. In addition to the technical requirements, the Contractor shall present cost breakdown, schedule, risks (with mitigation plan) and any other issues that might impact the manufacturing and final delivery of the hardware. As part of this review package, the Contractor shall also provide the following documentation, Notes/Comments, Hardware/Data Shortages, Non-flight Hardware/Temporary Installations, and Battery Data Report. The CDR review will be held at the Contractors location and is expected to last one day.

2.1.3 Qualification Unit Delivery Review

Along with the delivery of the Qualification Unit hardware, the required documentation as defined in DRD 1537MA-004 shall accompany hardware. The Contractor shall present all Qualification Unit deviations from the CDR package per DRD 1537CM-001. As part of this review package, the Contractor shall also provide the following documentation, Title Page, Index Page, Approval Page, DD Form 250, Notes/Comments, Hardware/Data Shortages, Non-flight Hardware/Temporary Installations, and Battery Data Report. The Qualification Unit Delivery Review will be held at the Contractors location and is expected to last one half day.

2.1.4 Acceptance Review

The Acceptance Review is the final review and acceptance of the flight unit including the Ground Support Hardware and any non-flight hardware/temporary Installations. DRD 1537MA-004 specifies the required presentation package along with all documentation to accompany the hardware. As part of this review package, the Contractor shall also provide the following

documentation, Title Page, Index Page, Approval Page, DD Form 250, Notes/Comments, Hardware/Data Shortages, Non-flight Hardware/Temporary Installations, and Battery Data Report. The Acceptance Review will be held at the Contractors location and is expected to last one day.

2.2 Schedule, Monthly Report and Status Meetings

The Schedule, Monthly Report and Status Meetings shall provide visibility to the Contractor and the Government of actual and potential problems, and of progress towards meeting the cost, technical and schedule requirements.

2.2.1 Program/Project Schedules

The Contractor shall prepare and submit a Program/Project Schedules in accordance with DRD 1537MA-003 which specifies the documentation to meet the reporting requirements. The schedule is to provide the Contractor's time-phased plan, current status, key milestones, task interdependencies, and major development phases necessary to accomplish the scope of work.

2.2.2 Monthly Progress Report

The Contractor shall prepare and submit a Monthly Progress Report in accordance with DRD 1537MA-002. Monthly Progress reporting of schedule, cost, risk (with mitigation plan), and safety aspects of the design, manufacturing, testing, and implementation phases is required for a successful completion of the activities outlined in this Statement of Work.

2.2.3 Monthly Status Meeting

A Monthly Status Meeting will be held within three days after the monthly status report has been delivered to the Government. This meeting will be for the Contractor and Government to discuss any concerns either may be having in meeting any objectives defined in this SOW. Technical issues can also be discussed at this meeting. The meeting shall be held by teleconferences and is expected to last no more than two hours.

2.3 Safety

The Contractor shall establish and implement an industrial safety, occupational health, and environmental program that provides a workplace free from recognized hazardous conditions and is free of incidents and injuries by (1) preventing employee fatalities, (2) reducing the number and severity of employee injuries and illnesses, (3) protecting the environment through the ongoing planning, implementation, integration and management control of these programs in accordance with DRD 1537SA-002, Off-site Safety, Health and Environmental (SHE) Plan. The Contractor's SHE Plan shall address in detail each SHE Core Program Requirement (CPR), including their sub-elements identified as applicable to the contracted effort and provide the level of detail necessary to acknowledge the Contractor fully understands the SHE CPRs.:

a. CPR 1 - Management Leadership and Employee Involvement.
b. CPR 2 - Worksite Analysis.
c. CPR 3 - Hazard Prevention and Control.
d. CPR 4 - Safety, Health and Environmental Training.
e. CPR 5 - Environmental Management System.

The Contractor shall report mishaps and safety statistics to the MSFC Industrial Safety Branch in accordance with DRD 1537SA-003, Off-site Mishap and Safety Statistics Reports. The contractor shall submit directly into the NASA Mishap Information System (NMIS) or shall use the forms listed in section 15.4 of DRD 1537SA-003 or electronic equivalent to report mishaps and related information required to produce the safety metrics.

3. Hardware Deliverables

The hardware deliverables for this SOW consists of a Qualification Unit, a Flight Unit, Ground Support Equipment, and any Non-flight Hardware/Temporary Installations for integration and checkout of the avionics box. Once a successful review completion associated with a particular hardware has been conducted, the hardware will be delivered per the instruction in Contract Section F.5 Delivery Instructions.

3.1 Qualification Unit

The Contractor shall fabricate the complete avionics box (including the sequencer and battery) as defined in the SLS-SPIE-RQMT-020 Secondary Payloads Deployment System Avionics Requirements document. The Contractor shall deliver one qualification unit to be used for system integration testing. The review and documentation supporting the delivery of the hardware is specified in Section 2.1.3 of the SOW.

3.2 Flight Unit

The Contractor shall fabricate the complete avionics box designed to include the sequencer and battery as defined in the SLS-SPIE-RQMT-020 Secondary Payloads Deployment System Avionics Requirements document. The Contractor shall deliver one unit fully qualified for flight to be used on the EM-1 mission. The review and documentation supporting the delivery of the hardware is specified in Section 2.1.4 of the SOW.

3.3 Ground Support Equipment Development

The Contractor shall develop and deliver all GSE required to load and test multiple mission deployment scenarios in the avionics box using an RS422 interface as defined in SLS-SPIE-RQMT-020, Section 3.4.7.2. The necessary GSE shall be delivered with the Flight Unit. GSE requirements are per SLS-SPIE-RQMT-020, Section 3.4.17. The review and documentation supporting the delivery of the hardware is specified in Section 2.1.4 of the SOW. The Contractor shall prepare and submit a Ground Operations and Maintenance Requirements (OMR) in accordance with DRD 1537OP-001.

3.4 Non-flight Hardware/Temporary Installations

The Contractor shall develop and deliver any non-flight hardware/temporary installations, such as, pull tabs and protective covers that are required by design to protect and/or provide other functions to the hardware prior to installation and/or launch. All non-flight hardware/temporary installations shall be identified and written documentation explaining their fit/form/function provided. The documentation shall be delivered in accordance with DRD 1537MA-004.

4. Deliverables

The Contractor shall deliver the items that are listed in this section.

4.1 Data Deliverables

The delivery of each DRD shall be in accordance Item 11 and Item 12 of the DRD, and listed on DRD 1537MA-004.

The Contractor shall prepare and submit if necessary an EEE Nonstandard Parts Approval Request in accordance with DRD 1537AV-001.

The Contractor shall prepare and submit a Bonding, Grounding, Lightning, Indirect Affects and EMC Support Data in accordance with DRD 1537AV-002.

The Contractor shall prepare and submit an As-Built Parts List in accordance with DRD 1537AV-003.

The Contractor shall prepare and submit an As-Designed Parts List in accordance with DRD 1537AV-004.

The Contractor shall prepare and submit a Data Handling and Software Systems Analysis in accordance with DRD 1537AV-005.

Contractor desired deviations and waivers to Government controlled documentation in this SOW shall be generated and processed in accordance with DRD 1537CM-001.

Engineering drawings and associated lists shall be provided to meet the requirements of ASME Y14.100 and ASME Y14.41 in accordance with DRD 1537CM-002. This documentation shall define the detailed design of the hardware and firmware for the system. Engineering drawings shall specify marking criteria and methods for identification of parts.

The Contractor shall prepare and submit a SPDS Avionics Ascent Venting Analysis in accordance with DRD 1537DE-001.

The Contractor shall prepare and submit a SPDS Avionics Thermal Analysis in accordance with DRD 1537DE-002.

The Contractor shall prepare and submit a Structural Dynamics Analyses, Loads and Models in accordance with DRD 1537DE-003.

The Contractor shall prepare and submit a Material Usage Agreements (MUAs) in accordance with DRD 1537MP-001.

The Contractor shall prepare and submit a Material Identification and Usage List (MIUL) in accordance with DRD 1537MP-002.

The Contractor shall prepare and submit a Certificate of Qualification in accordance with DRD 1537QE-001. Certificate of Qualification (COQ) process shall be used for design certification of all flight hardware, line replaceable units, subsystems (as appropriate), and/or ground support equipment to meet NASA Safety and Mission Success policy, applicable product assurance (S&MA) plan and Verification/Validation Plan (DRD1537SE-001) to meet program/project needs. Certification programs shall be established based on criticality, design requirements and environmental criteria. Certification programs shall be structured to closely simulate the anticipated mission duty cycle. The following shall also be considered in the certification

program: Maintainability, operational life, stress analysis, design safety factors, redundancy features, storage, handling, transportation, pre-launch, flight, post-flight functional performance and environmental requirements.

The Contractor shall prepare and submit a Log Books in accordance with DRD 1537QE-002.

The Contractor shall prepare Failure Modes and Effect Analysis and Critical Items List in accordance with DRD 1537RM-001. Failure Modes Effects Analysis and Critical Item List (FMEA/CIL) effort is one of the most important program tasks to facilitate enhance safety and mission success. FMEA shall be initiated as part of upfront integrated design effort with participation of component designers and pursued through all the phases of the program. FMEA/CIL shall identify design strengths and opportunities with respect to flight safety and/or mission risks and this analysis shall support integrated system design effort. Functional FMEA shall be performed from the conceptual design stage, as part of integrated design effort; and progressively transition to hardware FMEA as the design matures. Critical Items List (CIL) analysis shall be performed for those failure modes which could lead to worst case failure conditions such as Loss of Crew (LOC), Loss of Vehicle (LOV), Loss of Mission (LOM) and/or other criticalities which are detrimental to the program.

The Contractor shall implement a Reliability Analysis Report in accordance with DRD 1537RM-002. The Reliability Analysis Report identifies all tasks and activities (processes, tools and technologies) planned by the contractor early in the design and subsequently as the program mature, identify processes for verification/demonstration of key Reliability and Maintainability (R&M) parameters through analysis, testing and/or similarity, and planned controls. All key R&M processes shall be documented with complete details, underlying assumptions, ground rules and analysis. The contractor shall provide NASA with all the supporting rationale, information, data, software access in support of R&M analysis and results.

The Contractor shall provide a Limited Life Items List (LLIL) in accordance with DRD 1537RM-003. The LLIL shall document the results of design certification of all limited life flight hardware, line replaceable units and/or subsystems (as appropriate), to meet NASA Safety and Mission Success policy, applicable product assurance (S&MA) plan and Verification and Validation Plan to meet program/project needs. Life limits shall be established based on criticality, reliability and safety requirements, and environmental criteria. Life limits for associated ground support equipment shall be documented based on baselined specifications that include the expected environmental conditions, operational constraints, or hardware failure which could cause loss or damage to vehicle systems and/or personnel.

The Contractor shall perform and document a System Safety/Hazard Analyses Report in accordance with 1537SA-001. The analyses shall identify hazards, determine the methods used for controlling the hazards, support the program risk management process, and establish verification methods applicable to design, development, manufacturing and assembly, testing, inspection, integration, and flight (of subject systems) including any interfacing ground support equipment, facilities, and ground operations. The analysis shall include flight systems (hardware and software) ground support equipment and facilities.

The Contractor shall develop, document, and implement a verification and validation program that confirms the deliverable product is in compliance with requirements and is ready for a particular use, function, or mission. The following six tasks shall be performed as part of a comprehensive and thorough verification and validation program:

a. The verification/validation planning shall be developed and documented in accordance with DRD 1537SE-001. Verification/Validation planning shall be developed that provides more details and discussions of the identified verification/validation activities and provides an overview approach of the overall verification/validation program.
b. The verification/validation reports shall be developed and documented in accordance with DRD 1537SE-002. The verification/validation reports shall report the results of the planned activities with respect to the identified success criteria.
c. The verification/validation compliance assessment which identifies and correlates the submitted reports against the products' set of requirements shall be in accordance with DRD 1537SE-003. Determination of the product's ability to meet the set of requirements and readiness for a particular use, function, or mission shall be based on the assessment of the verification/validation report(s).

The Contractor shall prepare and submit a Test and Checkout Procedures in accordance with DRD 1537SE-004.

The Contractor shall prepare and submit a Mass Properties Data in accordance with DRD 1537SE-005.

4.2 Hardware/Data Shortage

The Contractor shall provide a list of minor shortages that occur as part of any delivery package outlined in DRD 1537MA-004. This list is to contain the items short, number short of that item, expected delivery date, and impact to delivery package. The Contractor shall pre-coordinate with the Government any item that will be short.

4.3 Battery Data Report

The Contractor shall provide a Battery Data Report that details the battery/batteries that are part of the avionic box hardware. The Battery Data Report shall contain at a minimum, the manufacturer, manufacture date(s), lot number(s), battery type, battery size, and battery capacity. The Battery Data Report shall be delivered at the Critical Design Review, Qualification Unit Delivery Review, and the Acceptance Review.

ATTACHMENT J-1(a)
SLS-SPIE-RQMT-020, SPACECRAFT PAYLOAD INTEGRATION AND EVOLUTION OFFICE SECONDARY PAYLOAD DEPLOYMENT SYSTEM AVIONICS REQUIREMENTS AND ADDENDUM

The specification as amended or instructions on how to obtain the specification are located in the Acquisition Planning Tool (APT):

https://ec.msfc.nasa.gov/doing_business/
Select on Acquisition Planning Tool button on left
Select Secondary Payloads Avionics Box Development button in the middle
Select details button on right
Select APT supporting documents button in middle

ATTACMENT J-2
DATA PROCUREMENT DOCUMENT (DPD)

DATA PROCUREMENT DOCUMENT NO. 1537 ISSUE Draft

NNM15536283R
CONTRACT/RFP

EXHIBIT NUMBER

J-2
ATTACHMENT NUMBER

Secondary Payloads Avionics Box Development
PROJECT/SYSTEM

DATA PROCUREMENT DOCUMENT

Contractor
CONTRACTOR

April 17, 2015
DATE

National Aeronautics and
Space Administration

MSFC - Form 3461 (Rev September 1989)

National Aeronautics and Space Administration

DOCUMENT CHANGE LOG

DATA PROCUREMENT DOCUMENT NO.	ISSUE
1537	Draft

INCORPORATED REVISIONS OUTSTANDING REVISIONS	AS OF: 04-17-15	SUPERSEDING:	PAGE:

AUTHORITY (DPD Revision)	PORTION AFFECTED - PAGE NO./NO.				REMARKS
	INTRO	SGR	DRL	DRD	

MSFC - Form 3461-1 (Rev. September 2007)

1.0 INTRODUCTION

1.1 Scope: Subject to the Rights in Data clause, this Data Procurement Document (DPD) sets forth the data requirements in each Data Requirements Description (DRD) and shall govern that data required by the DPD for the contract. The contractor shall furnish data defined by the DRDs listed on the Data Requirements List (DRL) by category of data, attached hereto, and made a part of this DPD. Such data shall be prepared, maintained, and delivered to NASA in accordance with the requirements set forth within this DPD. In cases where data requirements are covered by a Federal Acquisition Regulation (FAR) or NASA FAR Supplement (NFS) clause, that clause shall take precedence over the DPD, consistent with clause FAR 52.215-8.

1.2 DPD Description: This DPD consists of a Document Change Log, an Introduction, a Statement of General Requirements, DPD maintenance procedures, a DRL, and the DRDs.

1.2.1 General Requirements: The general requirements, as specified in paragraph 2.0 of this DPD, prescribe those requirements applicable to the preparation, maintenance, and delivery of data that are better defined in aggregate than in the individual DRDs.

1.2.2 Data Requirements List (DRL): Throughout the performance of the contract, the DRL provides a listing by data category of the data requirements of the DPD.

1.2.3 Data Requirements Description (DRD)

1.2.3.1 Each data requirement listed on the DRL is given complete definition by a DRD. The DRD prescribes content, format, maintenance instructions, and submittal requirements.

1.2.3.2 For the purpose of classification and control, DRDs of this DPD are grouped into the following broad functional data categories:

CATEGORY SYMBOL	DESCRIPTION
AV	Avionics
CD	Contractual Data
CM	Configuration Management
DE	Design and Development
MA	Management
MP	Materials and Processes
OP	Operations
QE	Quality Engineering
RM	Reliability and Maintainability
SA	Safety
SE	Systems Engineering

1.2.3.3 The symbols representing these data categories form part of the prefix of the DRD identification number. The first numerical characters reflect the DPD number.

1.2.3.4 To facilitate the usage and maintenance of the DPD, the DRDs have been sectionalized in accordance with the above data categories.

1.2.3.5 The DRDs are filed by data category and are in alpha-numeric sequence as listed on the DRL page (or pages) that precedes the DRDs.

1.2.4 Document Change Log (DCL): The Document Change Log chronologically records all revision actions that pertain to the DPD.

1.2.5 DPD Maintenance Procedures: Maintenance procedures define the detailed methods to be employed in maintaining the DPD. Detailed maintenance procedures are specified in paragraph 3.0 of this DPD.

1.3 Data Types for Contractual Efforts: The types of data and their contractually applicable requirements for approval and delivery are:

TYPE	DESCRIPTION
1*	All issues and interim changes to those issues require written approval from the requiring organization before formal release for use or implementation.
2*	NASA reserves a time-limited right to disapprove in writing any issues and interim changes to those issues. The contractor shall submit the required data to NASA for review not less than 45 calendar days** prior to its release for use. The contractor shall clearly identify the release target date in the "submitted for review" transmittal***. If the data is unacceptable, NASA will notify the contractor within 45 calendar days** from the date of submission, regardless of the intended release date***. The contractor shall resubmit the information for reevaluation if disapproved. The submittal is considered approved if the contractor does not receive disapproval or an extension request from NASA within 45 calendar days**.
3	These data shall be delivered by the contractor as required by the contract and do not require NASA approval. However, to be a satisfactory delivery, the data shall satisfy all applicable contractual requirements and be submitted on time.
4	These data are produced or used during performance of the contract and are retained by the contractor. They shall be delivered only when NASA requests in writing and shall be delivered in accordance with the instructions in the request. The contractor shall maintain a list of these data and shall furnish copies of the list to NASA when requested to do so.
5	These data are incidental to contract performance and are retained by the contractor in those cases where contracting parties have agreed that formal delivery is not required. However, the Contracting Officer or the Contracting Officer's Representative (COR) shall have access to and can inspect this data at its location in the contractor's or subcontractor's facilities, or in an electronic database accessible to the Government.

* Note: Type 1 and Type 2 data may be placed under NASA configuration management control when designated by NASA. CM control requires the contractor to submit Type 1 and Type 2 data updates through Engineering Change Proposals (ECPs).

** Note: This time limit may be tailored for individual DRDs to meet the requirements of the procuring activity.

*** Note: If the contractor does not identify a release target date or if the intended release date is shorter than 45 calendar days from the date of submission, the 45 calendar days review cycle stands (or the tailored Type 2 time limitation for the specific procurement).

2.0 STATEMENT OF GENERAL REQUIREMENTS

2.1 Applicable/Reference Documents: Documents included as applicable documents in this DPD are the issue specified in the Statement of Work, and form a part of the DPD to the extent specified herein. Applicable documents listed in Item 15.2 of a DRD are applicable only to the preparation of the deliverable documentation described by that DRD.

References to documents other than applicable documents in the data requirements of this DPD may sometimes be utilized, and shall be indicated in 13. Remarks of the DRD. These do not constitute a contractual obligation on the contractor. They are to be used only as a possible example or to provide related information to assist the contractor in developing a response to that particular data requirement.

2.2 Subcontractor Data Requirements

2.2.1 The contractor shall specify to subcontractors and vendors, if any, the availability source of all data required for the satisfactory accomplishment of their contracts. The contractor shall validate these requirements for documents when appropriate; where the requirement concerns other contractor data, the contractor shall provide his subcontractor or vendor with the necessary documents. All such requests shall be accomplished under the auspices of the contractor.

2.2.2 Reference to subcontractor data in the contractor's responses is permissible, providing the references are adequate and includes such identification elements as title, number, revision, etc., and a copy of the referenced data is supplied with the response document at time of delivery to NASA.

2.3 Data Distribution, Format, Data Restriction Marking, and Transmittal

2.3.1 Distribution: Distribution of required documentation shall be in quantities determined by the Contracting Officer. Recipient names and email (if applicable) addresses shall be noted on a separate distribution list to be furnished by the Contracting Officer. The Contracting Officer's letter may include other information pertinent to delivery of data, as required.

2.3.2 Format

2.3.2.1 Electronic Format: Electronic submission of data deliverables is required. Electronic deliverables shall be printable. Data deliverables shall be delivered to NASA in the format specified below unless a specific format is required by a DRD. Data submittals shall consist of a single Adobe Acrobat PDF file and the native format electronic file(s). The preferred native formats include Microsoft Word, Excel, PowerPoint or CAD drawing plot file, as appropriate. Where a single native format file is not possible, multiple files may be integrated into a single ZIP file for submission. The organization of the contents of the integrated ZIP file shall be made readily apparent to the reader, and each file within the integrated product shall be clearly identifiable and traceable within the organization of the integrated product. If files are fragmented, file names shall be labeled logically and contiguously, and the files shall be easily reassembled or merged (e.g. 1 filename, 2 filename, 2a filename, etc.). The software versions shall be confirmed prior to submittals.

2.3.2.2 Hardcopy Format: In addition to the electronic submittal, one hardcopy package of specific data deliverables shall be delivered to the NASA Contracting Officer for the Government contract file. The hardcopy package shall consist of the contractor's Transmittal Memo and one copy of the data deliverable.

2.3.3 Data Restriction Marking

2.3.3.1 Data Restriction Determination and Marking Requirements: The contractor shall determine the data restriction that applies to each data deliverable and mark the data restriction on the data coversheet, or indicate the data restriction in the data transmittal package if the data format precludes identification of data restriction directly in the data. The contractor shall make a determination for each individual data deliverable item, and shall not apply a default or blanket data restriction marking to all data deliverables (e.g., "data may be export restricted"). If NASA does not agree with the contractor applied data restriction, the NASA Contracting Officer shall return the data to the contractor, cancel the markings, or ignore the markings consistent with the procedures set forth in the "data rights" clause(s) contained in the contract.

2.3.3.2 Data Restriction Categories and Marking Statements: The contractor shall consider the following data restriction categories, as a minimum, and utilize specified marking statements.

If data delivered under this contract is subject to the International Traffic in Arms Regulations (ITAR), the data shall contain an "ITAR Notice" as follows:

International Traffic in Arms Regulations (ITAR) Notice
This document contains information which falls under the purview of the U.S. Munitions List (USML), as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR 120-130, and is export controlled. It shall not be transferred to foreign nationals, in the U.S. or abroad, without specific approval of a knowledgeable NASA export control official, and/or unless an export license/license exemption is obtained/available from the United States Department of State. Violations of these regulations are punishable by fine, imprisonment, or both.

If data delivered under this contract is subject to the Export Administration Regulations (EAR), the data shall contain the "EAR Notice" as follows:

Export Administration Regulations (EAR) Notice
This document contains information within the purview of the Export Administration Regulations (EAR), 15 CFR 730-774, and is export controlled. It may not be transferred to foreign nationals in the U.S. or abroad without specific approval of a knowledgeable NASA export control official, and/or unless an export license/license exception is obtained/available from the Bureau of Industry and Security, United States Department of Commerce. Violations of these regulations are punishable by fine, imprisonment, or both.

If the contract contains FAR 52.227-14 *Alternate II*, the "Limited Rights Notice" may be applicable to data (other than computer software) delivered under this contract.

If the contract contains FAR 52.227-14 *Alternate III*, the "Restricted Rights Notice" may be applicable to computer software delivered under this contract.

If the contract contains FAR 52.227-20, the "SBIR Rights Notice" may be applicable to SBIR data delivered under this contract.

If the contract contains NFS 1852.237-73, a sensitive information legend may be applicable to information delivered under this contract.

In accordance with the applicable data clause (e.g., FAR 52.227-14(c) or FAR 52.227-20(c)), the contractor may be able to assert a copyright claim in data delivered under this contract. When claim to copyright is made, the Contractor shall affix the applicable copyright notices of 17 U.S.C. 401 or 402 and acknowledgment of Government sponsorship (including contract number) to the data when such data are delivered to the Government.

2.3.4 Transmittal

2.3.4.1 Data shall be transmitted to NASA by email, CD or DVD, hardcopy, or other mechanism agreed to by the Contracting Officer, COR, and Project representatives who are responsible to receive, index, and store the data deliverables.

2.3.4.2 If email is used to transmit data deliverables, the email size shall be 10 Megabytes or less to ensure receipt by the NASA email servers. Encrypted email format shall be used to transmit data which has been judged sensitive by the contractor (e.g., export controlled, limited rights data, SBIR, restricted computer software, copyrighted, etc.).

2.3.4.3 Data Transmittal Package: Each data transmittal package shall include:

a. Transmittal memorandum that specifies the meta-data below for each data transmittal:
   1. Contract number.
   2. Data Requirements Description (DRD) number.
   3. DRD data type (specified in Item 3 on the DRD).
   4. Submission date or milestone being satisfied.
   5. Document number and revision.

6. Document title.
7. File names of all files being delivered; file naming convention shall clearly identify the document being delivered.
8. Distribution (as defined by the Contracting Officer's letter).
9. Requested response date.
10. Contractor assigned data restriction (export controlled, limited rights data, SBIR, restricted computer software, copyrighted, etc.) if not marked on data.
11. NASA Records Retention Schedule (NRRS) number, if applicable (See NPR 1441.1, NASA Records Retention Schedules).

b. Printable electronic files or hardcopy data.

2.3.5 When electronic data deliverables are transmitted directly to the MSFC Repository, the Digital Asset Manager web interface shall be utilized. Instructions for electronic data submittals can be found at http://avmcc.msfc.nasa.gov/repository/repository_submittal.php. Document submitters to the Repository must register for a MSFC EDMS (Documentum) user account, through the Identity Management and Account Exchange (idMAX) system. Computer-Aided Design (CAD) drawings shall be submitted in the original native vector, Hewlett-Packard Graphic Language (HPGL), and raster image formats.

2.4 Printing: All printing, duplicating, or binding shall be in accordance with NFS 1852.208-81, Restrictions on Printing and Duplicating. Printing of formal reports and Type 1 and 2 data in book format shall be in accordance with the following general specifications:

a. Method of reproduction – offset/xerography.
b. Finished size – 8 1/2" X 11".
c. Paper – 20-pound opaque bond.
d. Cover – Litho cover stock.
e. Pages shall be printed on both sides; blank pages shall be avoided when possible.
f. Oversize pages shall be avoided when possible, but if necessary shall be folded to 8 1/2" X 11".
g. Binding shall be the most economical method commensurate with the size of the report and its intended use.

2.5 Contractor's Internal Documents: The contractor's internal documents shall be used to meet the data requirements of this DPD unless a specific format is required by the applicable DRD.

2.6 Document Identification: Type 1 and 2 documents published by the contractor and submitted in response to the data requirements of this DPD shall be identified within an organized identification numbering system prescribed to NASA by the contractor and, if applicable, as approved by NASA. For all data types, the document number, change legend, date, and title constitute the minimum identification of the specific document and shall appear on the cover and title page. The contract number shall also appear on the cover and title page as separate markings. The originator and organization shall be included on the title page. The document number, change legend, and date shall appear on each page of the document. In the front matter of each document, identify the DPD number and applicable DRD number(s) required for document preparation. Successive issues or revisions of documents shall be identified in the same manner as the basic issue and shall have appropriate change identification. Drawings and ECP's are excluded from the marking provisions of this paragraph. All Type 1 documentation, excluding configuration management requirements, shall be marked "PRELIMINARY PENDING NASA APPROVAL," and once approved shall be reissued with "APPROVED BY NASA" and the date and approval authority annotated on the cover.

2.7 Reference to Other Documents and Data Deliverables in Data Submittals: All referenced documents shall be made readily available to the cognizant NASA organization upon request. The contractor shall make sure that the references are available to NASA in a manner which does not incur delays in the use of the response document. Reference may be made, within one data submittal, to other data submittals delivered in response to this DPD in those cases where the data required by one DRD may have been delivered by the contractor in response to another DRD. The reference to previously-submitted data shall include the applicable DRD number, data submittal version date, and location within the referenced document.

2.8 Maintenance of Type 1 Document Submittals

2.8.1 Revisions of Type 1 documentation may be accomplished either by individual page revision or by a complete reissue of the document identified in accordance with requirements of 2.6 above, with the exception of drawings (which shall be revised in accordance with contract configuration management requirements).

2.8.2 Individual page revisions shall be made as deemed necessary by the contractor or as directed by the Contracting Officer.

2.8.3 A Type 1 document shall be completely reissued when, in the opinion of the contractor and/or NASA, the document has been revised to the extent that it is unusable in its present state, or when directed by the Contracting Officer. When complete reissues are made, the entire contents of the document shall be brought up to date and shall incorporate revised pages. All revisions shall be recorded. A revision log shall identify complete reissues except for periodic reports and documents which are complete within themselves as final.

2.8.4 Changes of a minor nature to correct obvious typing errors, misspelled words, etc., shall only be made when a technical change is made, unless the accuracy of the document is affected.

2.8.5 All revised pages shall be identified by a revision symbol and a new date. Each document shall contain a log of revised pages that identify the revision status of each page with the revision symbol. This list shall follow the table of contents in each document. The line or lines revised on a given page shall be designated by the use of vertical line in the margin of the page, and the change authority shall be indicated adjacent to the change.

2.8.6 Contractor Type 1 document shall not be submitted containing pen and ink markups which correct, add to, or change the text, unless schedule problems exist and approval is obtained in writing from the Contracting Officer. Such markups, however, shall not exceed 20 percent of the page content and shall be acceptable provided that the reproduced copies are legible. In addition, hand-drawn schematics, block diagrams, data curves, and similar charts may be used in original reports in lieu of formally prepared art work, as long as legibility of copies is not impaired. Acceptability shall be determined by the Contracting Officer.

3.0 DPD MAINTENANCE PROCEDURES

3.1 NASA-Initiated Change: New and/or revised data requirements shall be incorporated by contract modification to which the new or revised portion of the DPD shall be appended. The contractor shall notify the Contracting Officer in the event a deliverable data requirement is imposed and is not covered by a DRD, or when a DRD is changed by a contract modification and for which no revision to DPD is appended. In such cases, the contractor shall submit the requested changes to NASA for approval. See paragraph 3.3.1 for change procedures.

3.2 Contractor-Initiated Change: Contractor-proposed data requirements or proposed changes to existing requirements shall be submitted to NASA for approval.

3.3 DPD Change Procedures

3.3.1 Changes to a contractual issue of this DPD shall be identified by NASA on the Document Change Log.

3.3.2 The date of the DPD shall be entered under the "as of" block of the Document Change Log. The date that was in the "as of" block shall be entered in the "Superseding" block.

3.3.3 The Document Change Log entitled "Incorporated Revisions" shall be changed to indicate the modification number, portions affected, and remarks. All changes to the DPD/DRDs shall be identified in the "Remarks" column.

3.4 DPD Reissues

3.4.1 When conditions warrant, the DPD shall be reissued by NASA for each contract modification that affects the DPD and shall supersede the existing DPD in its entirety. Reissues shall be issued by contractual direction.

3.4.2 All revision dates shall remain in the Date Revised block on all DRDs. The issue symbol, which shall commence with "A" and progress through "Z," shall be entered in the DPD identification block of each DRD page of the DPD.

Secondary Payloads Avionics Box Development

Data Requirements List

DRD	DATA TYPE	TITLE	OPR
AV - Avionics			
1537AV-001	2/3	EEE Nonstandard Parts Approval Request (NSPAR)	ES43
1537AV-002	3	Bonding, Grounding, Lightning, Indirect Affects and EMC Support Data	ES43
1537AV-003	3	As-Built Parts List	ES43
1537AV-004	3	As-Designed Parts List	ES43
1537AV-005	3	Data Handling and Software Systems Analysis	ES33
CD – Contractual Data			
1537CD-001	3	Technology Reports	ZP30
CM - Configuration Management			
1537CM-001	1	Deviations and Waiver Approval Requests	EE12
1537CM-002	3	Engineering Drawings and Associated Lists	EE12
DE – Design and Development			
1537DE-001	3	SPDS Avionics Ascent Venting Analysis	EV30
1537DE-002	3	SPDS Avionics Thermal Analysis	EV30
1537DE-003	2	Structural Dynamics Analyses, Loads and Models	EV31/ER41/ ES22
MA – Management			
1537MA-001	3	Final Scientific and Technical Report	EE04
1537MA-002	3	Monthly Progress Report	FP30
1537MA-003	3	Program/Project Schedules	CS40
1537MA-004	3	Major Review Documentation	FP30
MP – Materials and Processes			
1537MP-001	1/2	Material Usage Agreements (MUAs)	EM03
1537MP-002	3	Materials Identification and Usage List (MIUL)	EM03
OP – Mission Operations			
1537OP-001	3	Ground Operations and Maintenance Requirements (OMR)	EO40
QE – Quality Engineering			
1537QE-001	1	Certificate of Qualification (COQ)	QD22
1537QE-002	3	Log Books	QD22
RM – Reliability and Maintainability			
1537RM-001	1/2	Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)	QD22
1537RM-002	3	Reliability Analysis Report	QD22
1537RM-003	3	Limited Life Items List	QD22
SA – Safety			
1537SA-001	1	System Safety/Hazard Analysis Reports	QD22
1537SA-002	2	Off-site Safety, Health, and Environmental (SHE) Plan	AS10/QD12
1537SA-003	3	Off-site Mishap and Safety Statistics Reports	QD12

Secondary Payloads Avionics Box Development
Data Requirements List

DRD	DATA TYPE	TITLE	OPR
SE - Systems Engineering			
1537SE-001	2	Verification/Validation Planning (VVPLAN)	ES11
1537SE-002	2	Verification/Validation Reports (VVREP)	ES11
1537SE-003	3	Verification/Validation Compliance (VVC) Assessment	ES11
1537SE-004	3	Test and Checkout Procedures	ES43
1537SE-005	3	Mass Properties Data	EV74

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537AV-001**
3. **DATA TYPE**: 2/3
4. **DATE REVISED**:
5. **PAGE**: 1/1

6. **TITLE**: Electrical, Electronic and Electromechanical (EEE) Nonstandard Parts Approval Request (NSPAR)

7. **DESCRIPTION/USE**: To identify and provide rationale for usage of nonstandard electrical, electronic, and electromechanical (EEE) parts as defined in SLS-RQMT-019.

8. **OPR**: ES43 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**: At time of non-standard parts identification; draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: As data becomes available to support approval; final as part of the Acceptance Data Package (ADP)

13. **REMARKS**: Pre-coordination of nonstandard parts approval requests (NSPAR) with MSFC EEE Parts Engineering is recommended.

14. **INTERRELATIONSHIP**: SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The EEE Nonstandard Parts Approval Request provides the means for requesting approval to use nonstandard electrical, electronic, and electromechanical parts in the system design.

15.2 **APPLICABLE DOCUMENTS**:

SLS-RQMT-019	*Space Launch System Program (SLSP) Electrical, Electronic, and Electro-mechanical (EEE) Parts Management and Control Requirements Document*

15.3 **CONTENT**: The EEE Nonstandard Parts Approval Request shall use SLS-RQMT-019 as a guide and shall conform to the following:

a. Part 1: Nonstandard part usage request. (Type 2)
   1. Source Control Drawing or approved vendor equivalent control drawing or specification on nonstandard part being submitted for approval meeting SLS-RQMT-019 or equivalent plan.
b. Part 2: EEE Part Qualification Test Report. (Type 3)
   1. Submittal of qualification test report in vendor format to support requirements defined in the above Source Control Drawing or approved vendor control drawing or specification.

15.4 **FORMAT**: Use of MSFC Form 4346 or contractor format is acceptable. NSPARs shall include all information as specified in SLS-RQMT-019 and will be made available via electronic media.

15.5 **MAINTENANCE**: Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537AV-002**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/1

6. **TITLE**: Bonding, Grounding, Lighting, Indirect Affects and EMC Support Data

7. **DESCRIPTION/USE**: To describe engineering data to be provided by the Contractor in support of the SLS Electromagnetic Environmental Effects (E3) Control Plan.

8. **OPR**: ES43 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**: Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: Final as part of the Acceptance Data Package (ADP); update as required

13. **REMARKS**:

14. **INTERRELATIONSHIP**: SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Bonding, Grounding, Lightning, Indirect Affects and EMC Support Data necessary to fully integrate the SLS Vehicle Electromagnetic Environmental Effects (E3) Control Plan, and the SLS Spectrum Control across all SLS Elements.

15.2 **APPLICABLE DOCUMENTS**: None

15.3 **CONTENT**: The Bonding, Grounding, Lightning, Indirect Affects and EMC Support Data shall include:

a. Electrical Bonding Information.
   1. Interface engineering drawings which include material selection, corrosion protection strategy and process (conversion coating, nickel plating, etc.), and physical specifications/dimensions of bonding surface.

b. Lightning Indirect Effects Information.
   1. Lightning actual transient level analysis.
   2. Lightning indirect effects qualification information (test procedure, test levels, and waveforms selected for each Avionics item).

c. EMI Qualification Test Reports.
   1. EMI test reports that contain SLS Program Level 2 required testing which shall be delivered to SLS Vehicle Integration.

15.4 **FORMAT**: Contractor format is acceptable.

15.5 **MAINTENANCE**: Changes shall be incorporated by Change Notice (CN) and/or by complete re-issue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft 2. **DRD NO.:** **1537AV-003**
3. **DATA TYPE:** 2 4. **DATE REVISED:**
5. **PAGE:** 1/1

6. **TITLE:** As-Built Parts List

7. **DESCRIPTION/USE:** To identify the Electrical, Electronic, and Electromechanical (EEE) parts actually used, to identify manufacturers of those parts, and to serve as a traceability record for the EEE parts installed in delivered equipment.

8. **OPR:** ES43 9. **DM:** FP30

10. **DISTRIBUTION:** Per contracting officer's letter

11. **INITIAL SUBMISSION:** Final as part of the Qualification Unit Delivery Review data package and Acceptance Data Package (ADP)

12. **SUBMISSION FREQUENCY:** Subsequent changes in configuration

13. **REMARKS:** This data is used to verify acquisition of parts from qualified sources and for determining applicability of problems reported (such as Problem Advisories and ALERTs).

14. **INTERRELATIONSHIP:** DRD 1537AV-004, *As-Designed Parts List*. SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The As-Built Parts List provides required information for all EEE parts actually used in the assembly of contractor equipment.

15.2 **APPLICABLE DOCUMENTS:**

SLS-RQMT-019	*Space Launch System Program (SLSP) Electrical, Electronic, and Electro-mechanical (EEE) Parts Management and Control Requirements Document*

15.3 **CONTENTS:** The As-Built Parts List shall include the following for each EEE part used:

a. Delivered end item or equipment identification (part number and serial number).
b. EEE part's next higher assembly identification (part number and serial number).
c. EEE part type.
d. EEE part number.
e. Generic EEE part number.
f. Grade of EEE part as defined in SLS-RQMT-019.
g. Identification of additional PIND/X-ray for SLS-RQMT-019 standard Grade 2 EEE part.
h. EEE part's circuit locating reference designation.
i. EEE part manufacturer's identification [Name and Commercial and Government Entity (CAGE) code or equivalent].
j. EEE part's lot identification (Lot Date Code or equivalent).
k. EEE part's serial number, if applicable.
l. Identification that an item has been changed from a previous submission.

15.4 **FORMAT:** MSFC approved contractor format is acceptable. Data shall be submitted by editable electronic media (e.g. Excel or Access format).

15.5 **MAINTENANCE:** Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537AV-004**
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** As-Designed Parts List
7. **DESCRIPTION/USE:** To document Electrical, Electronic, and Electromechanical (EEE) parts selected for use, the method for part level qualification, and other associated information.
8. **OPR:** ES43
9. **DM:** FP30
10. **DISTRIBUTION:** Per contracting officer's letter
11. **INITIAL SUBMISSION:** As-designed as a part of the Critical Design Review (CDR) data package
12. **SUBMISSION FREQUENCY:** Update quarterly to document the current design as required
13. **REMARKS:** This list has an integral role in EEE parts verification and obsolescence management and must be kept up to date.
14. **INTERRELATIONSHIP:** DRDs 1537AV-002, *EEE Parts Nonstandard Parts Approval Request* and 1537AV-003, *As-Built Parts List.* SOW paragraph 4.1
15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The As-Designed Parts List identifies the EEE parts approved for use in contractor, subcontractor, supplier, and in-house equipment designs.

15.2 **APPLICABLE DOCUMENTS:**

SLS-RQMT-019	*Space Launch System Program (SLSP) Electrical, Electronic, and Electro-mechanical (EEE) Parts Management and Control Requirements Document*

15.3 **CONTENTS:** The As-Designed Parts List shall comply with requirements stated in *Electrical, Electronic and Electromechanical (EEE) Parts Management and Control Requirements Document for the [Project Title]* and include the following for each EEE part used:

a. Deliverable end item or equipment identification (part number).
b. EEE part type.
c. EEE part number.
d. Generic EEE part number.
e. Grade of EEE part as defined in SLS-RQMT-019.
f. EEE part specification.
g. EEE part qualification method and status.
h. Identification of additional PIND/X-ray for SLS-RQMT-019standard Grade 2 EEE part.
i. Nonstandard EEE part approval identification and status.
j. Identification of EEE part manufacturer [QML, QPL, or name and CAGE code].
k. Quantity of EEE part used in equipment (estimated).
l. Indication that item is a change from the previous submission.

15.4 **FORMAT:** MSFC approved contractor format is acceptable. Data shall be submitted by editable electronic media (e.g. Excel or Access format).

15.5 **MAINTENANCE:** Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537AV-005**
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1

6. **TITLE**: Data Handling and Software Systems Analysis

7. **DESCRIPTION/USE**: To analyze data management system (DMS) resources and associated requirements and provide visibility of resource margins and DMS performance measures.

8. **OPR**: ES33 9. **DM**: FP30

10. **DISTRIBUTION**: Per contracting officer's letter

11. **INITIAL SUBMISSION**: Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: Final as part of the Qualification Unit Delivery Review data package and Acceptance Data Package (ADP); update as required

13. **REMARKS**:

14. **INTERRELATIONSHIP**: SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Data Handling and Software Systems Analysis provides visibility into critical data and software resource utilization and margins.

15.2 **APPLICABLE DOCUMENTS**: None

15.3 **CONTENTS**: The Data Handling and Software Systems Analysis shall:

a. Analyze hardware and software measurement, command, and control requirements for data management system resources and provide visibility into resource consumption and margins. Analysis shall include error rate assessments, timing margins, and loading of data links, memory, programmable devices, and central processing units (CPU).

b. Provide a continuous assessment of DMS resource margins and performance, and ensure adequate margins for each mission and each operational phase. This analysis shall contain:
   1. Functional block diagram of DMS hardware and software systems, including estimated data path lengths.
   2. Summary description of the DMS systems architecture and pertinent functional capabilities.
   3. Charts and graphs depicting DMS resource requirements, margins, and trends.
   4. Analysis results, discussions, and recommendations.

15.4 **FORMAT**: Contractor format acceptable.

15.5 **MAINTENANCE**: Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537CD-001**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/3

6. **TITLE**: Technology Reports

7. **DESCRIPTION/USE**: Provides NASA with technical information concerning any invention, discovery, improvement, or innovation made by a contractor in the performance of work under this contract for the purpose of disseminating this information to obtain increased use and provide NASA with data to review for possible patentable items.

8. **OPR**: ZP30 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**:
Technology Reporting Plan: Upon Contracting Officer's request.
Disclosure of Invention and New Technology (NASA Form 1679): Immediately or within two months of identification of reportable item(s).
Interim NASA New Technology Summary Report (NTSR) Form: 12 months from the date of the contract.
Final NASA New Technology Summary Report (NTSR) Form: Immediately or within two months after completion of contracted work. Final Payment is contingent upon submission of the Final NTSR.

12. **SUBMISSION FREQUENCY**:
Technology Reporting Plan: Upon Contracting Officer's request.
Disclosure of Invention and New Technology (NASA Form 1679): Upon identification of each reportable item.
Interim NASA New Technology Summary Report (NTSR) Form: Every 12 months.
Final NASA New Technology Summary Report (NTSR) Form: Immediately or within two months after completion of contracted work. Final Payment is contingent upon submission of the Final NTSR.

13. **REMARKS**: Copies of NASA Form 1679 and the NASA New Technology Summary Report (NTSR) Form (Interim and Final) may be obtained and/or filled out at: https://ntr.ndc.nasa.gov/ or https://invention.nasa.gov/. These forms may also be obtained from the New Technology Representative (mailto: Carolyn.E.McMillan@nasa.gov).

14. **INTERRELATIONSHIP**: SOW paragraph 2

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Technology Reports include technical detail as is necessary to identify and fully describe a "Reportable Item". Per NFS 1852.227-70, "Reportable Item" means any invention, discovery, improvement, or innovation of the contractor, whether or not the same is or may be patentable or otherwise protectable under Title 35 of the United States Code, conceived or first actually reduced to practice in the performance of any work under this contract or in the performance of any work that is reimbursable under any clause in this contract providing for reimbursement of costs incurred prior to the effective date of this contract.

15.2 **APPLICABLE DOCUMENTS**:
NFS 1852.227-70 *New Technology Clause*

DRD Continuation Sheet

TITLE: Technology Reports **DRD NO.**: 1537CD-001
DATA TYPE: 3 **PAGE**: 2/3

15. **DATA PREPARATION INFORMATION (CONTINUED):**

15.3 **CONTENTS**: The Technology Reports consist of:

a. Disclosure of Invention and New Technology (Including Software): In accordance with NFS 1852.227-70 (e)(2), the disclosure to the agency shall be in the form of a written report and shall identify the contract under which the reportable item was made and the inventor(s) or innovator(s). It shall be sufficiently complete in technical detail to convey a clear understanding, to the extent known at the time of the disclosure, of the nature, purpose, operation, and physical, chemical, biological, or electrical characteristics of the reportable item. The disclosure shall also identify any publication, on sale, or public use of any subject invention and whether a manuscript describing such invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to the agency, the Contractor shall promptly notify the agency of the acceptance of any manuscript describing a subject invention for publication or of any on sale or public use planned by the Contractor for such invention. This reporting requirement may be met by completing NASA Form 1679 (latest revision) in hardcopy or online at: https://ntr.ndc.nasa.gov/ or https://invention.nasa.gov/. Use of this form or the online system is preferred; however, if the form is not used the following information should be provided in order to meet the reporting requirement:

1. Descriptive title.
2. Innovator(s) name(s), title(s), phone number(s), and home address(es).
3. Employer when innovation made (name and division).
4. Address (place of performance).
5. Employer status (e.g., Government, college or university, non-profit organization, small business firm, large entity).
6. Origin (e.g., NASA grant number, NASA prime contract number, subcontractor, joint effort, multiple contractor contribution, other).
7. NASA Contracting Officer's Technical Representative (COTR).
8. Contractor/grantee New Technology Representative.
9. Brief abstract providing a general description of the innovation:
   (a) Description of the problem or objective that motivated the innovation's development.
   (b) Technically complete and easily understandable description of innovation developed to solve or meet the objective.
   (c) Unique or novel features of the innovation and the results or benefits of its application.
   (d) Speculation regarding potential commercial applications and points of contact (including names of companies producing or using similar products).
10. Additional documentation.
11. Degree of technological significance (e.g., modification of existing technology, substantial advancement in the art, major breakthrough).
12. State of development (e.g., concept only, design, prototype, modification, production model, used in current work).
13. Patent status.
14. Dates or approximate time period during which this innovation was developed.
15. Previous or contemplated publication or public disclosure including dates.
16. Answers to the following questions (for software only):
   (a) Using outsiders to beta-test code? If yes, done under beta-test agreement?
   (b) Modifications to this software continue by civil servant and/or contractual agreement?
   (c) Previously copyrighted (if so, by whom?)?
   (d) Were prior versions distributed (if yes, supply NASA or Contractor contract)?
   (e) Contains or is based on code owned by a non-federal entity (if yes, has a license for use been obtained?)?
   (f) Has the latest version been distributed without restrictions as to use or disclosure for more than one year (if yes, supply date of disclosure)?
17. Name(s) and signature(s) of innovator(s).

DRD Continuation Sheet

TITLE: Technology Reports
DRD NO.: 1537CD-001
DATA TYPE: 3
PAGE: 3/3

15. **DATA PREPARATION INFORMATION (CONTINUED):**

b. Interim NASA New Technology Summary Report (NTSR): This report shall consist of a listing of reportable items for the reporting period or certification that there are none. This report shall also contain a list of subcontracts containing a patent rights clause or certification that there were no such subcontracts. Completion of the Interim NTSR shall satisfy this reporting requirement. Use of the form utilizing the online system at: https://ntr.ndc.nasa.gov/ or https://invention.nasa.gov/ is preferred; however an alternate format is acceptable provided all required information is provided.

c. Final NASA New Technology Summary Report (NTSR): This report shall consist of a comprehensive list of all reportable items for the contract duration or certification that there are none. This report shall also contain a list of subcontracts containing a patent rights clause or certification that there were no such subcontracts. Completion of the Final NTSR shall satisfy this reporting requirement. Use of the form utilizing the online system at: https://ntr.ndc.nasa.gov/ or https://invention.nasa.gov/ is preferred; however an alternate format is acceptable provided all required information is provided.

d. Subcontracts: The contractor shall provide copies of subcontracts containing a patent rights clause upon Contracting Officer's request.

15.4 **FORMAT**: To report a Disclosure of Invention and New Technology (Including Software) NASA Form 1679 (latest version) may be used or submit the report online at: https://ntr.ndc.nasa.gov/ or https://invention.nasa.gov/, or provide sufficient information to meet the reporting requirement.

The interim and final NASA New Technology Summary Reports may use the NTSR Form (Interim or Final whichever is applicable) utilizing the online system at: https://ntr.ndc.nasa.gov/ or https://invention.nasa.gov/, or provide sufficient information to meet the reporting requirement.

15.5 **MAINTENANCE:** None required

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537CM-001**
3. **DATA TYPE**: 1
4. **DATE REVISED**:
5. **PAGE**: 1/1

6. **TITLE:** Deviation/Waiver Approval Request

7. **DESCRIPTION/USE:** Deviation: A specific written authorization granted before the fact to depart from a particular Government-controlled requirement for a limited application. Waiver: A specific written authorization accepting a departure after occurrence from a Government controlled requirement for a limited application.

8. **OPR**: EE12 9. **DM**: FP30

10. **DISTRIBUTION:** Per Contracting Officer's letter

11. **INITIAL SUBMISSION:** As deviations and waivers are identified as being needed. Status provided as a part of the Critical Design Review (CDR) package

12. **SUBMISSION FREQUENCY**: Final as part of the Qualification Unit Delivery Review data package and Acceptance Data Package (ADP); update as required

13. **REMARKS:**

14. **INTERRELATIONSHIP:** SOW paragraphs 2.1.3 and 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The Deviation/Waiver Approval Request (DAR) requests approval for a limited departure from a Government-controlled requirement.

15.2 **APPLICABLE DOCUMENTS:**

MSFC-STD-3394 *Standard for Contractor Configuration Management Requirements, MSFC Programs/Projects*

15.3 **CONTENTS:** DARs shall be prepared in accordance with MSFC-STD-3394, using MSFC Form 847, Deviation/Waiver Approval Request prepared in accordance with its instructions. The program control number (PCN), as assigned by MSFC, and the DAR number assigned by the contractor shall be shown on all forms.

15.4 **FORMAT:** MSFC Form 847, Deviation/Waiver Approval Request (DAR) shall be used to document deviations and waivers.

15.5 **MAINTENANCE:** All requested changes to a DAR shall require submittal of a DAR revision.

15.6 **APPROVAL OF DEVIATIONS/WAIVERS:** Receipt of contractual approval from the procuring activity shall constitute the sole authority for the contractor to affect a DAR. This approval will be noted by disposition notation and the authorizing signature on the MSFC Form 847.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537CM-002**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/2

6. **TITLE**: Engineering Drawings and Associated Lists

7. **DESCRIPTION/USE**: To provide engineering data defining the design to the extent required to support manufacturing, testing prior to delivery, integration into the vehicle, any remaining pad processing activities, any remaining testing from point of delivery through launch, logistics support including required spare parts. Engineering drawings, associated lists, and system electrical data shall be sufficient to depict the detailed configuration of all system, subsystem, and component levels. The corresponding 2D and 3D CAD models shall be submitted. The system electrical data is defined as all hardware that performs the generation, distribution, control, or management of electricity within the Element. In general, the electrical system begins with each source of power (i.e. battery) or signal (i.e. data bus) and ends at the user interface of each end item (load). Engineering drawings and associated lists shall meet the requirements of ASME Y14.100. Geometric Dimensioning and Tolerancing shall be implemented in accordance with ASME Y14.5M. 2D/3D CAD shall meet the requirements of ASME Y14.41.

8. **OPR**: EE12 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer letter

11. **INITIAL SUBMISSION**: Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: Final submitted as part of the Qualification Unit Delivery Review data package and Acceptance Data Package (ADP); update as required

13. **REMARKS**:

14. **INTERRELATIONSHIP**: SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: Engineering drawings disclose (directly or by reference) the electrical interconnect and grounding configuration for the Element electrical system and the physical and functional requirements of an item/assembly by means of graphics or textual presentation or combinations of both, as supplemented by 3D models.

15.2 **APPLICABLE DOCUMENTS**:

ASME Y14.100	*Engineering Drawing Practices*
ASME Y14.41	*Digital Product Definition Data Practices*
ASME Y14.5M	*Dimensioning and Tolerancing*
MIL-STD-130M	*Department of Defense Standard Practices, Identification Marking of U.S. Military Property*
MIL-STD-961	*Defense and Program-Unique Specifications Format and Content*

15.3 **CONTENTS**: Requirements:

a. Drawings and parts lists shall be provided for any assemblies, subassemblies, parts, installations, or kits which define the product(s) delivered to the government. CAD Models shall be traceable to the specific version of drawings delivered.

b. Engineering drawings and associated lists shall meet the requirements of ASME Y14.100. Geometric Dimensioning and Tolerancing shall be implemented in accordance with ASME Y14.5. Engineering drawings and associated lists of end items, elements and/or all components and assemblies shall be provided to define the details necessary for the manufacture, test, inspection, operations and logistic support of the system. This definition shall:

1. Reflect the end-product.

DRD Continuation Sheet

TITLE: Engineering Drawings and Associated List **DRD NO.: 1537CM-002**
DATA TYPE: 3 **PAGE:** 2/3

15. **DATA PREPARATION INFORMATION (CONTINUED):**

2. Provide the engineering data for logistics support products.
3. Provide the necessary data to permit manufacture and/or acquisition of items identical to the original item(s).

c. Document directly or by reference the following:

1. Details of unique processes (i.e., not published or generally available to industry) when essential to design and manufacture.
2. Performance ratings when applicable.
3. Dimensional and tolerance data (Geometric Dimensioning and Tolerancing (GD&T) shall be required between all external and major internal interfaces).
4. Critical manufacturing processes and assembly sequences, and rigging procedures.
5. Diagrams and schematics not provided per other DRDs.
6. Mechanical and electrical connections.
7. Physical characteristics, including form and finish.
8. Details of material identification, including heat treatment and protective coatings.
9. Inspection, test, and evaluation criteria.
10. Equipment calibration requirements.
11. Quality assurance requirements.
12. Hardware marking requirements.
13. Requirements for reliability, maintainability, environmental conditions, shock, and vibration testing and other operational or functional tests.
14. Drawing tree or indentured parts list.

d. Limited rights-in-data items - Engineering drawings for items which the Government does not have unlimited rights in data shall specify the form, fit, and function requirements of the item and conform to the requirements for a control drawing as defined in ASME Y14.100 or a specification prepared in accordance with the requirements of MIL-STD-961.

e. Cable Interconnect Diagram (CID) - The CID schematically depicts the cable harness interconnections within the Spacecraft Payload Integration and Evolution Office (SPIE) electrical system. All internal and external interconnections shall be shown with each connector identified by its assigned reference designator short sign. Interface Control Documents (ICD) applicable to interfaces shown on the CID shall be identified in the drawing notes. Assembly/unit numbers shall be shown for each assembly/subassembly shown on the CID.

f. Electrical System Schematic (ESS) - The ESS schematically depicts all interconnections between electrical system components at the wiring level. Wiring within each box or assembly which performs power control or distribution shall be shown in sufficient detail to support/facilitate the power system analyses described in (h) and (i) below.

g. Grounding Diagram - The Grounding Diagram is a schematic depiction of all grounding circuits and power returns within the SPIE electrical system and shall include all power grounds and returns, signal grounds, command returns, and shield grounds.

h. Voltage Drop Analysis - Using circuit resistance values based on wire gauge, wire length, temperature conditions, circuit element resistances, and varying load conditions including worst case loading and input voltage parameters, the electrical system shall be analyzed to determine voltage drops on all major circuits. Major circuits are defined as those loads powered by a primary power source such as a ground feed, battery, inverter, generator, or power distributor and include but are not limited to loads such as pumps, solenoid valves, primary avionics assemblies, and motors. Lower level circuits driven by internal power supplies are exempted from this analysis.

i. Circuit Protection and Wire Sizing Analysis Wiring on all major circuits (see definition above) shall be analyzed to ensure the selected gauge and insulation will be sufficient under worst case current loading and environmental conditions. Circuit protection (fusing, circuit breakers, etc.) shall be analyzed to ensure that wiring on all major circuits will be protected in accordance with de-rating criteria established for the Element under worst case current loading and environmental conditions.

DRD Continuation Sheet

TITLE: Engineering Drawings and Associated List **DRD NO.**: **1537CM-002**
DATA TYPE: 3 **PAGE**: 3/3

15. **DATA PREPARATION INFORMATION (CONTINUED)**:

15.4 **FORMAT**: Format of engineering drawings shall be in accordance with ASME Y14.100. Drawings shall be delivered in Visio or PDF file format. The corresponding 2D and 3D CAD models shall be submitted in PRO-E or STEP file format.

15.5 **MAINTENANCE**: Changes to and/or updating of engineering drawings and associated lists shall be in accordance with the contractor's approved drawing system and the provisions herein and provided to the Government when available.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537DE-001**
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1

6. **TITLE:** SPDS Avionics Ascent Venting Analysis

7. **DESCRIPTION/USE:** To be responsible for generating the SPDS avionics ascent venting analysis. This DRD is intended to be a guide that defines the expected deliverables from the contractor. The deliverables include ascent venting analysis report. This document provides ascent venting environments for use in the design and analysis of the Secondary Payload Deployment System (SPDS) for the SLS Block 1 vehicle. This report includes descriptions of the analytical approach as well as the inputs used in development of the ascent venting analyses.

8. **OPR:** EV30 9. **DM:** FP30

10. **DISTRIBUTION:** Per Contracting Officer's letter

11. **INITIAL SUBMISSION:** Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY:** Final as part of the Acceptance Data Package (ADP); update as required

13. **REMARKS:**

14. **INTERRELATIONSHIP:** SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The SPDS Avionics Ascent Venting Analysis includes developing the ascent venting analysis to verify vent rate is compatible with the vehicle.

15.2 **APPLICABLE DOCUMENTS:** None

15.3 **CONTENT:** The SPDS Avionics Ascent Venting Analysis shall be met to assure no over pressuring of the unsealed potion of the avionics unit.

15.4 **FORMAT:** Microsoft Word and/or Excel.

15.5 **MAINTENANCE:** Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537DE-002**
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/2

6. **TITLE:** SPDS Avionics Thermal Analysis

7. **DESCRIPTION/USE:** The contractor is responsible for the SPDS Avionics unit thermal analysis. These deliverables include Thermal Math Models (TMMs) and thermal analyses reports for all mission phases.

8. **OPR:** EV30 9. **DM:** FP30

10. **DISTRIBUTION:** Per Contracting Officer's letter

11. **INITIAL SUBMISSION:** Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY:** Final submitted as part of the Acceptance Data Package (ADP); update as required

13. **REMARKS:**

14. **INTERRELATIONSHIP:** SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The SPDS Avionics Thermal Analysis reports will present the evidence, analysis inputs and results and ultimately data that verifies the design meets the requirements.

15.2 **APPLICABLE DOCUMENTS:** None

15.3 **CONTENT:** The SPDS Avionics Thermal Analysis shall provide the following:

a. Thermal Analysis Reports:
   1. Provide a brief overview of the avionics box, objectives and all mission timelines. This includes a summary the overall Thermal Control System (TCS) design.
   2. Describe the TCS design. Include aspects of the design such as the philosophical approach, the hardware selected, and the hardware heritage (previous flight experience), etc. Identify and describe the implementation of any new technologies.
   3. Describe the driving requirements and available resources and/or limitations giving references to their origin. Include requirements such as temperature limits, heat loads, natural and induced environments, power dissipation timelines, dictated or derived boundary conditions, interfaces, mission phases, operating and non-operating conditions, any off-nominal conditions, contingency conditions, safety/reliability considerations, etc.
   4. Describe the TMMs and analytical techniques used to predict TCS performance. Include a description of the computational tools, math models, analytical methods, equations, algorithms, etc. Include a listing and discussion of the input parameters (thermo-optical and thermophysical material properties, boundary conditions, timelines, interface conditions, avionics power dissipations, etc.) and provide references that justify use of these inputs. Include rationale for any assumptions or simplifying analytical methods used in the model. Provide the thermal model(s) and any necessary associated files in electronic format.
   5. Provide the predicted thermal performance for all applicable mission phases (ground transportation, pre-launch, launch/ascent, on orbit, etc.) including off-nominal conditions and possible contingencies. Provide a comparison of the expected performance to the required performance for all operating and non-operating conditions as applicable.

b. Thermal Math Models described in Section 15.3 a, along with all files required for proper execution of the models.

DRD Continuation Sheet

TITLE: SPDS Avionics Thermal Analysis **DRD NO.: 1537DE-002**

DATA TYPE: 3 **PAGE**: 3/3

15. **DATA PREPARATION INFORMATION (CONTINUED):**

15.4 **FORMAT**: Preferred format for Thermal Model deliveries is in Thermal Desktop. Contractor format is acceptable, accompanied with an overview of the analytical tools used in the modeling approach, if different from Thermal Desktop. Documentation deliveries are in MS Word, MS PowerPoint and/or PDF format. Thermal analysis deliveries are in memo format (MS Word or PDF format) per the contractor's standard mission integration process.

15.5 **MAINTENANCE**: Revision history logs shall be maintained and version/revision numbering for all delivered models.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537DE-003**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/3

6. **TITLE**: Structural Dynamics Analyses, Loads, and Models

7. **DESCRIPTION/USE**: To define the structural dynamics analyses, loads, and models to be used for the design of the flight article and its associated equipment.

8. **OPR**: EV31/ER41/ES22 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**: Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: Final as part of the Acceptance Data Package (ADP); update as required

13. **REMARKS**:

14. **INTERRELATIONSHIP**: SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Structural Dynamics Analyses, Loads, and Models addresses tasks associated with structural dynamics which includes as a minimum the calculation of structural loads, mode shapes and natural frequencies, dynamic response, vibration environments (acoustically-induced, mechanically-induced, etc.), internal acoustic environments, shock environment and slosh parameters.

15.2 **APPLICABLE DOCUMENTS**:

ES22 (12-028)	*Transportation and Handling Limit Load Factors*
NASA-STD-5002	*Loads Analyses of Spacecraft and Payloads*
MSFC-STD-3676	*Development of Vibroacoustic and Shock Design and Test Criteria*
NASA-STD-7009	*Standards for Models and Simulations*
NASA-HDBK-7009	*NASA Handbook for Models and Simulations: An Implementation guide for NASA-STD-7009*

15.3 **CONTENTS**: The Structural Dynamics Analyses, Loads, and Models shall consist of analyses, reporting, data books, and models. Since each project is unique, changes to analysis, reporting, data books, and models requirements shall be approved by the appropriate Marshall Space Flight Center (MSFC) Project Office of Primary Responsibility (OPR) technical authority.

a. Structural Dynamics Analyses:
   1. Conduct structural dynamics analyses to determine the maximum prediction environment (MPE), loads conditions and parameters for design and testing of the flight article, its systems, subsystems and components. All phases in the life of the hardware and components, including fabrication, assembly, testing, transportation, ground handling, checkout, launch, flight, return, etc., shall be considered in defining the MPE and loads.
   2. Conduct structural dynamic response analyses and loads analyses of the flight article, its systems subsystems and components to determine operational limits and restrictions.
   3. Loads analyses and forcing functions shall be generated in accordance with best practices/processes and appropriate documented guidelines approved by the OPR technical authority with additional information provided by project loads control plan, NASA-STD-5002, and memorandum ES22 (12-028).
   4. Development of vibroacoustics and shock MPE and test criteria shall be per MSFC-STD-3676.

DRD Continuation Sheet

TITLE: Structural Dynamics Analyses, Loads, and Models **DRD NO.:** 1537DE-003
DATA TYPE: 3 **PAGE:** 2/3

15.3 **DATA PREPARATION INFORMATION (CONTINUED):**

5. Environments used for response analyses shall include all vibration, shock, and mechanical induced environments including pressure fluctuations due to flow induced vibrations, cross correlated pressure measurements that occur during the combustion process, and vibroacoustics phenomena.
6. Vibroacoustic and shock environments to be used for range safety, transportation, hardware qualification, and workmanship screening should also be provided. The appropriate technical authority shall review and approve the predicted acoustic, vibration and shock environment. These environments must be used as the basis for qualification testing, component loads development, secondary structure load development, and prediction of structural dynamic response. Components shall be certified to the dynamic environment by dynamic testing per NASA-STD-5002 and MSFC-STD-3676.

b. Reporting:
   1. Analyses reporting shall include, but is not limited to, describing the structural dynamic response and loads analyses conducted on the flight article, its systems, subsystems, and components to calculate stresses and/or to identify operational limits and restrictions. In addition, assumptions, methodology, boundary conditions, uncertainties, applied environments for response analyses, rationale, appropriate results, Campbell or resonance diagrams for normal modes, characterized modal parameters for response analyses, plots of modes, and proper reference of models shall be provided.
   2. Model reporting shall include, but is not limited to, modeling assumptions, model description, applied loads, damping data, absorption data, material properties, structural properties and sizing, connection information, pertinent modeling parameters, model display, material properties, mass properties, applicable frequency range, pertinent design parameters, pertinent input parameters, and identify type of model.
   3. Validation and verification of structural dynamic models and calculated responses, forcing functions, loads, and environments for all flight hardware - utilizing analysis, test, and flight data – shall be included in the model and analyses reporting.

c. Data Books: Structural dynamics data Book(s) (DB) (e.g. loads data book and vibration, shock, and acoustics data book) shall be generated, kept current and approved by the appropriate MSFC Project OPR technical authority. All significant structural dynamic environments, parameters, constraints, restraints, test criteria, and loads encountered during the service life, from manufacturing to end of service, static, dynamic, steady state, and transient loads shall be documented. Load combinations shall be defined and documented.

d. Models: The structural dynamic mathematical and computational models and forcing functions used for loads and dynamics response and prediction analyses shall be generated in accordance with best practices and appropriate documented guidelines. (See NASA-STD-7009 and NAS-HDBK-7009 for definition of mathematical and computational models.) A list and scope of the structural dynamics models, and the intended frequency range, shall be proposed by the contractor and approved by the appropriate MSFC Project OPR technical authority. Models shall be made available to the MSFC Project OPR technical authority upon request.
   1. Loads models: Model and model run files delivery is required. Delivery requirements will be defined by the appropriate MSFC Project OPR technical authority. A list and scope of the loads models, and the intended frequency range, shall be proposed by the contractor and approved by the appropriate MSFC Project OPR technical authority. Deliverables shall include, but are not limited to analysis mathematical models, desired loads recovery outputs and results (loads transformation matrices, loads indicators, etc.), boundary DOF definitions, and applied environments.
   2. Vibroacoustic models: Model and model run files delivery is required. Delivery requirements will be defined by the appropriate MSFC Project OPR technical authority. A list and scope of the vibroacoustic models, and the intended frequency range, shall be proposed by the contractor and approved by the appropriate MSFC Project OPR technical authority. If a Statistical Energy Analysis (SEA) model is created partially or directly from a Finite Element Model (FEM), the FEM shall be delivered with the SEA model with documentation of the SEA model and FEM.

DRD Continuation Sheet

TITLE: Structural Dynamics Analyses, Loads, and Models **DRD NO.:** 1537DE-003
DATA TYPE: 3 **PAGE:** 3/3

15.3 **DATA PREPARATION INFORMATION (CONTINUED):**

15.4 **FORMAT**: For reports, plans, and data book, compatible electronic program/project/activity format is acceptable.

a. For NASTRAN models, the NASTRAN .bdf format, which can be augmented with MSC/PATRAN .db format, is preferred with electronic delivery.

b. For SEA, BEA, and hybrid vibroacoustic models, delivered per the agreed format of the OPR technical authority, which includes the analysis run version.

c. For ANSYS models, ANSYS workbench and/or db files.

15.5 **MAINTENANCE**: Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537MA-001**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/1

6. **TITLE**: Final Scientific and Technical Report

7. **DESCRIPTION/USE**: To provide a summary of the results of the entire contract effort, including recommendations and conclusions based on the experience and results obtained.

8. **OPR**: EE04 9. **DM**: FP30

10. **DISTRIBUTION**: Final report shall be submitted to the Contracting Officer, the contractor shall concurrently provide to the Center STI/Publication Manager and the NASA Center for AeroSpace Information (CASI) a copy of the letter transmitting the final report to the Contracting Officer. The copy of the letter shall be submitted to CASI at the address listed at http://www.sti.nasa.gov under the "Get Help" link.

11. **INITIAL SUBMISSION**: 30 days after completion of contract

12. **SUBMISSION FREQUENCY**: One time submittal

13. **REMARKS**:

14. **INTERRELATIONSHIP**: SOW paragraph 2

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Final Scientific and Technical Report summarizes the results of the entire contract work.

15.2 **APPLICABLE DOCUMENTS**:

NFS 1835.70	*Center for AeroSpace Information – Final Scientific and Technical Report*
NFS 1852.235-73	*Final Scientific and Technical Reports*
MPR 2220.1	*Scientific and Technical Publications*
NPR 2200.2	*Requirements for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information*

15.3 **CONTENTS**: The Final Scientific and Technical Report shall be prepared and submitted in accordance with NFS 1835.70 and meet the requirements of 1852.235-73. The report shall summarize the results of the entire contract, including recommendations and conclusions based on the experience and results obtained. The report shall include tables, graphs, diagrams, curves, sketches, photographs, and drawings in sufficient detail to explain comprehensively the results achieved under the contract. The report shall include a completed NASA Form 1676 and Standard Form 298 as the final page, per MPR 2220.1, NPR 2200.2 and NFS 1852.235.73(c).

15.4 **FORMAT**: The final report shall be of a quality suitable for publication and shall follow the formatting and stylistic guidelines contained in MPR 2220.1 and NPR 2200.2. Electronic formats are required. See http://www.sti.nasa.gov/, "Publish STI, Draft STI and Electronic File Formats" for appropriate types of formats. The final page of the report shall be in accordance with NASA Form 1676 and Standard Form 298. One electronic copy of each NASA STI Report Series publication is sent to NASA CASI. One hard copy is requested but not required. (The hard copy may be used to validate that math and symbols have not encountered a font substitution during transmission.). Electronic format shall be in accordance with NFS 1852.235-73.

15.5 **MAINTENANCE**: None required

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537MA-002**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/1
6. **TITLE**: Monthly Progress Report
7. **DESCRIPTION/USE**: To provide visibility to contractor and MSFC project management of actual and potential problems and progress toward meeting the cost, technical and schedule requirements.
8. **OPR**: FP30
9. **DM**: FP30
10. **DISTRIBUTION**: Per Contracting Officer's letter
11. **INITIAL SUBMISSION**: First calendar month following the end of the first full month after Authority to Proceed (ATP), unless otherwise specified by the Contracting Officer
12. **SUBMISSION FREQUENCY**: 15 days following the end of each month
13. **REMARKS**:
14. **INTERRELATIONSHIP**: SOW paragraph 2.2.2
15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Monthly Progress Report provides data for the assessment of monthly cost, technical and schedule progress.

15.2 **APPLICABLE DOCUMENTS**:
NFS 1852.235-74 *Additional Reports of Work - Research and Development*

15.3 **CONTENTS**: The Monthly Progress Report shall meet the requirements of NFS 1852.235-74 and shall contain the following:

a. Work accomplished for current reporting period, including a report of overall cost, technical and schedule performance.
b. Work planned for next reporting period.
c. Current problems which impede performance or impact program schedule or cost, and proposed corrective action.
d. Other information that assist the Government in evaluating the contractor's cost, technical and schedule performance, e.g., innovative processes and cost reduction initiatives.

15.4 **FORMAT**: Contractor format is acceptable.

15.5 **MAINTENANCE**: None required

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537MA-003**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/1

6. **TITLE**: Program/Project Schedules

7. **DESCRIPTION/USE**: To provide management insight into contractor status, key milestones, potential problem areas, and critical path identification, which will serve as the basis for evaluating contractor performance.

8. **OPR**: CS40 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**: Draft Integrated Master Schedule (IMS) with proposal. Baseline IMS 30 working days following Authority to Proceed (ATP).

12. **SUBMISSION FREQUENCY**: Monthly, no later than 5th working day of the start of the calendar month. Schedule shall be presented as a part of the Critical Design Review (CDR) data package.

13. **REMARKS**: NASA/SP-2010-3403, *NASA Schedule Management Handbook* may be used as guides in preparation of the schedules.

14. **INTERRELATIONSHIP**: SOW paragraph 2.2.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Program/Project Schedules provides data for the management and assessment of contract schedule and logic network of the tasks to be performed.

15.2 **APPLICABLE DOCUMENTS**: None

15.3 **CONTENT**: The Program/Project Schedules shall include tasks necessary to accomplish the total scope of work defined in the statement of work (SOW) and identified in the work breakdown structure (WBS) used by the Contractor to manage the work. The integrated schedule shall include logical relationships (interdependencies) between all tasks/milestones. The Program/Project Schedules shall be created and maintained in management software that supports automated time phasing of tasks, a logic driven critical path, and assessment. The entire scope of work shall be broken into schedule tasks and milestones (all approved WBS elements/SOW) at a clear and consistent level of detail, logically linked to allow discrete progress measurement and visibility into the overall development, fabrication, assembly, test, integration and delivery phase of each end item deliverable including all vendor, subcontractor, authorized government task agreements, and authorized contract changes.

The Program/Project Schedules shall contain the approved baseline, current forecasted dates, reported progress, and be traceable to the approved WBS/SOW. All interim schedules and baselines will be archived by the prime contractor through the project life-cycle. When major re-planning occurs throughout the life cycle of the Program/Project the contractor shall save interim baselines in their integrated Program/Project schedule. The contractor shall be directed by the SLS Secondary Payload Office, when to revise the schedule baseline. The following automated logic network database deliverable shall be consistent, statused monthly, based on the same cutoff date, and reflect government fiscal years.

15.4 **FORMAT**: Submission of the deliverable shall be by electronic media. Original baseline submittal shall be in MS Project.

15.5 **MAINTENANCE**: Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537MA-004**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/3

6. **TITLE**: Major Review Documentation

7. **DESCRIPTION/USE**: To conduct formal technical reviews to evaluate design and status, document baselines, and monitor disposition of action items and Review Item Discrepancies (RIDs).

8. **OPR**: FP30 9. **DM**: FP30

10. **DISTRIBUTION**: See Attachment 2

11. **INITIAL SUBMISSION**: See Attachment 2

12. **SUBMISSION FREQUENCY**: Per technical review

13. **REMARKS**: Note that the NASA methodology of major reviews utilizes an instrument that defines actions and discrepancies as a Review Item Discrepancy (RID), and this is documented in MPR 7123.1 (referenced below). The following documents may be used as a guide, dependent on the review: MPR 7123.1, *MSFC Systems Engineering Processes and Requirements*, and MSFC-HDBK-3173, *Project Management and Systems Engineering Handbook, Section 4.4.* All materials are classified as Type 3 except for RID closures which are Type 2. Closure of RIDs are submitted as each individual RID is closed. The data package for each review is required to be submitted two weeks prior to the start of the review. The presentation package for each review is required to be submitted 2 days prior to the review.

14. **INTERRELATIONSHIP**: SOW paragraph 2.1, 2.1.2, 2.1.3, 2.1.4, 3.4 and 4.2

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: Major Review Documentation contains all of the required documentation necessary to support major technical reviews.

15.2 **APPLICABLE DOCUMENTS**:

MPR 7123.1 *MSFC Systems Engineering Processes and Requirements*

15.3 **CONTENTS**: Major Review Documentation required for the following technical reviews shall be provided as described in Attachment 1. Additional documentation to be provided shall be outlined in Attachment 2 for distribution and availability of data:

a. Agenda - The agenda shall specify the time and place for the scheduled review, specific review items, supporting documentation, and key participants. Submit approved copies at the review.
b. Presentation Charts - Presentation charts shall be submitted at the review. They shall summarize the details contained in the data package and shall identify compliance with the technical review requirements.
c. Minutes - The minutes shall contain a description of the review with sufficient detail to enable the review to be made a matter of record. The minutes shall include the presentation charts, a listing of discrepancies, action items with actionee and suspense (closure) data.
d. Discrepancy Forms - Discrepancy forms (e.g. Review Item Discrepancies (RIDs), Requests for Action (RFAs)) showing action items, actionees, suspense dates and closure status shall be submitted.

15.4 **FORMAT**: Contractor format is acceptable.

15.5 **MAINTENANCE**: As required to correct errors and to maintain discrepancy closure status.

ATTACHMENT 1

1. Critical Design Review (CDR)
   Draft Bonding, Grounding, Lightning, Indirect Affects and EMC (DRD 1537AV-001)
   Draft EEE Nonstandard Parts Approval Request (DRD 1537AV-002)
   As-Designed EEE Parts List (DRD 1537AV-004)
   Draft Data Handling & Software Systems Analysis (DRD 1537AV-005)
   Deviations/Waivers Approval Requests (1537CM-001)
   Draft Engineering Drawing and Associated Lists (1537CM-002)
   Draft SPDS Avionics Ascent Venting Analysis (1537DE-001)
   Draft SPDS Avionics Thermal Analysis (1537DE-002)
   Draft Structural Dynamics Analyses, Loads, and Models (1537MA-003)
   Program/Project Schedules (1537MA-003)
   Material Usage Agreements (MUAs) (1537MP-001)
   Draft Materials Identification and Usage List (MIUL) (1537MP-002)
   Draft Ground Operations and Maintenance Requirements (OMR) (1537OP-001)
   Draft Failure Modes and Effects Analysis (FMEA) and Critical Items (1537RM-001)
   Draft Reliability Analysis Report (1537RM-002)
   Draft Limited Life Items List (1537RM-003)
   Draft System Safety/Hazard Analysis Report (1537SA-001)
   Draft Verification/Validation Planning (VVPLAN) (1537SE-001)
   Verification/Validation Reports (VVREP) (1537SE-002)
   Test and Checkout Procedures (1537SE-004)
   Mass Properties Data (1537SE-005)

2. Qualification Unit Delivery Review
   Final As-Built EEE Parts List (DRD 1537AV-003)
   Final Data Handling & Software Systems Analysis (DRD 1537AV-005)
   Deviations/Waivers Approval Requests (1537CM-001)
   Final Engineering Drawing and Associated Lists (1537CM-002)
   Final Certificate of Qualifications (COQ) (1537QE-001)
   Log Books (1537QE-002)
   Final Limited Life Items List (1537RM-003)
   Test and Checkout Procedures (1537SE-004)
   Final Verification/Validation Reports (VVREP) (1537SE-002)

3. Acceptance Review (AR)
   Final Bonding, Grounding, Lightning, Indirect Affects and EMC (DRD 1537AV-001)
   Final EEE Nonstandard Parts Approval Request (DRD 1537AV-002)
   Final As-Built EEE Parts List (DRD 1537AV-003)
   Final Data Handling & Software Systems Analysis (DRD 1537AV-005)
   Deviations/Waivers Approval Requests (1537CM-001)
   Final Engineering Drawing and Associated Lists (1537CM-002)
   Final SPDS Avionics Ascent Venting Analysis (1537DE-001)
   Final SPDS Avionics Thermal Analysis (1537DE-002)
   Final Structural Dynamics Analyses, Loads, and Models (1537MA-003)
   Final Material Usage Agreements (MUAs) (1537MP-001)
   Final Materials Identification and Usage List (MIUL) (1537MP-002)
   Final Ground Operations and Maintenance Requirements (OMR) (1537OP-001)
   Final Certificate of Qualifications (COQ) (1537QE-001)
   Log Books (1537QE-002)
   Final Failure Modes and Effects Analysis (FMEA) and Critical Items (1537RM-001)
   Final Reliability Analysis Report (1537RM-002)
   Final Limited Life Items List (1537RM-003)
   Final System Safety/Hazard Analysis Report (1537SA-001)

ATTACHMENT 2

Technical Review Documentation
Distribution and Availability of Data

Document	Type	Critical Design Review (Copies/Availability)	Qualification Unit Delivery and Acceptance Reviews (Copies/Availability)
Agenda	2	One electronic/15 days prior to review Approved copies at review	One electronic/15 days prior prior to review Approved copies at review
Data Package	3	One hard & one electronic/ Two weeks prior to review	One hard & one electronic/ Two weeks prior to review
Presentation Charts	3	One electronic/2 days prior to review	One electronic/2 days prior to review
Minutes	2	One electronic/ Within two weeks after review	One electronic/ Within two weeks after review
Discrepancy Forms (Generated at Review)	2	One Discrepancy Form/ Within five days of closure date	One Discrepancy Form/ Within one day of closure date

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537MP-001**
3. **DATA TYPE:** 1 (Cat I and II)
   2 (Cat III)
4. **DATE REVISED:**
5. **PAGE:** 1/2

6. **TITLE:** Material Usage Agreements (MUAs)

7. **DESCRIPTION/USE:** MUAs shall be submitted for all materials and processes that are technically acceptable but do not meet the stated requirements of NASA-STD-6016.

8. **OPR:** EM03 9. **DM:** FP30

10. **DISTRIBUTION:** Per Contracting Officer's letter

11. **INITIAL SUBMISSION:** Submit MUAs as alternatives to Material and Processes requirements that are utilized in the design and construction of the Avionics System. For category I and II MUAs the initial submittal shall occur promptly upon the determination that a compliant material or process cannot be used instead of the non-compliant material or process. This activity should occur at preliminary design development and as the need for new MUAs is identified during the detailed design process. Category III MUAs are submitted per the requirements for the MIUL. MUAs submitted as a part of the Critical Design Review (CDR) data package, as applicable.

12. **SUBMISSION FREQUENCY:** The key to a successful materials control program per NASA-STD-6016 is timely submittal of MUAs. MUAs shall be submitted during the design process whenever a material or manufacturing processes is identified that does not meet NASA-STD-6016 requirements. MUA submittal shall occur promptly upon identification of such a material or process. Final MUAs submitted as part of the Acceptance Data Package (ADP).

13. **REMARKS:** Reference is made to the MAPTIS database that contains a MUA Tool for completing, printing, and submitting a MUA. Account holders must request access to the MUA Tool at http://maptis.nasa.gov.

14. **INTERRELATIONSHIP:** DRDs 1537MP-002, *Materials Identification and Usage List (MIUL)* and 1537RM-001, *Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)*. SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE**: MUAs shall be submitted as described below.

Category I MUAs – those that involve material or process usage that could affect the safety of the mission, crew, vehicle, or affect the mission success, but must be utilized for functional reasons. Approval by the responsible NASA Materials and Processes organization and the NASA Program/Project office is required.

Category II MUAs – those that involve material or process usage that fails a screening of Materials and Processes requirements and is not considered a hazard in its use application but for which no Category III rationale code exists. Approval by the responsible NASA Materials and Processes organization is required.

Category III MUAs - those that involve materials or processes that have not been shown to meet minimum requirements but have an approved rationale code listed in NASA-STD-6016, Appendix B, or NASA approved Contractor equivalent. They are evaluated and determined to be acceptable at the configuration/part level.

Category III MUAs shall be reported in the Materials Identification and Usage List (MIUL) system or electronic data system utilizing the approved rationale codes in appendix B. A key may be provided to correlate contractor Category III MUA database codes to the codes in Appendix B.

DRD Continuation Sheet

TITLE: Material Usage Agreements (MUAs) **DRD NO.: 1537MP-001**
DATA TYPE: 1/2 **PAGE**: 2/2

15. **DATA PREPARATION INFORMATION (CONTINUED):**

15.2 **APPLICABLE DOCUMENTS**:

NASA-STD-6016	*Standard Materials and Processes Requirements for Spacecraft*
MSFC-STD-3029	*Guidelines for the Selection of Metallic Materials for Stress Corrosion Cracking Resistance in Sodium Chloride Environments*

15.3 **CONTENT**: The MUA package shall include all technical information required to justify using the selected material or process in the intended application in accordance with applicable documents specified in 15.2. .MUAs for stress corrosion susceptibility shall include a Stress Corrosion assessment in accordance with MSFC-STD-3029, Section 5.4 (also referred to as a Stress Corrosion Cracking Evaluation Form) and a stress analysis. The MAPTIS MUA Tool contains this evaluation form.

15.4 **FORMAT**: Contractor format shall be submitted electronic. An example MUA form is provided in NASA-STD-6016 Appendix A. See Remarks for information pertaining to the MAPTIS MUA Tool.

15.5 **MAINTENANCE**: Contractor updates to MUAs shall be submitted to NASA for approval. Any changes to a dispositioned (e.g. approved, deferred, rejected, etc.) MUA requires a complete re-issue of the MUA and the revision letter will be incremented and appended to the MUA Number. MUAs shall be revised and resubmitted whenever design modifications dictate changes such as the use environment, part numbers, or the approval rationale identified on the MUA.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537MP-002**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/2

6. **TITLE**: Materials Identification and Usage List (MIUL)

7. **DESCRIPTION/USE**: The Materials Identification and Usage List (MIUL) is an electronic searchable parts list or separate electronic searchable materials identification and usage list. The MIUL identifies all Material and Processes usages contained in the end item, excluding piece part electronics, for evaluation of the acceptability of Materials and Processes selected and utilized.

8. **OPR**: EM03 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer letter

11. **INITIAL SUBMISSION**: Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: Final as part of the Acceptance Data Package (ADP); update as required

13. **REMARKS**: Reference is made to MAPTIS database that contains an MIUL Tool for completing, printing, and submitting an MIUL. Account holders must request access to the MIUL Tool at http://maptis.nasa.gov/.

14. **INTERRELATIONSHIP**: SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: MIUL identifies all Materials and Processes (M&P) usages contained in the end item and shall be documented in an electronic searchable parts list or separate electronic searchable MIUL. The procedures and formats for documentation of materials and processes usage will depend upon specific hardware but shall cover the final contract end items. The system used shall be an integrated part of the engineering configuration control/release system. A copy of the stored data shall be provided to NASA in a form compatible with the Materials and Processes Technical Information System (MAPTIS). See the Remarks for information pertaining to the MAPTIS Tool.

15.2 **APPLICABLE DOCUMENTS**:
NASA-STD-6016 *Standard Materials and Processes Requirements for Spacecraft*

15.3 **CONTENT**: The parts list or MIUL shall identify the following applicable information in accordance with the applicable documents provided 15.2:

a. Detail drawing and dash number.
b. Next assembly and dash number.
c. Change letter designation.
d. Drawing source.
e. Material form.
f. Material manufacturer.
g. Material manufacturer's designation.
h. Material specification.
i. Process specification.
j. Environment.
k. Weight (for toxic and flammable materials) NASA-STD-6016 lists Weight (for nonmetallic materials).
l. MAPTIS Material code.
m. Standard/commercial part number.
n. Contractor.
o. System.

DRD Continuation Sheet

TITLE: Materials Identification and Usage List (MIUL) **DRD NO.:** 1537MP-002
DATA TYPE: 3 **PAGE:** 2/2

15. **DATA PREPARATION INFORMATION (CONTINUED):**
    - p. Subsystem.
    - q. Maximum temperature.
    - r. Minimum temperature.
    - s. Fluid type.
    - t. Surface area (nonmetallic materials).
    - u. Associate contractor number.
    - v. Project/Element.
    - w. Document title.
    - x. Criticality (fracture control designation: fracture critical, low risk, fail safe, exempt, etc.).
    - y. Line number.
    - z. Overall evaluation.
    - aa. Overall configuration test.
    - bb. Maximum operating pressure.
    - cc. Minimum operating pressure.
    - dd. MUA number or rationale code.
    - ee. Cure codes.
    - ff. MAPTIS Materials ratings (e.g. Flammability Rating, Stress Corrosion Cracking Rating, Corrosion Rating, Thermal Vacuum Stability Rating, Toxicity Rating, Fluid Systems Rating).
    - gg. Remarks (comments field).

15.4 **FORMAT**: Contractor format for electronic submittal of MIUL data shall be compatible with MAPTIS.

15.5 **MAINTENANCE**: Contractor updates to the MIUL shall be submitted to NASA for approval. Complete reissue of the document is not required.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537OP-001**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/2

6. **TITLE**: Ground Operations and Maintenance Requirements (OMR)

7. **DESCRIPTION/USE**: The Secondary Payload Avionics OMR inputs are operative data containing installation, operations, maintenance, handling, processing and analysis requirements that are necessary to maintain and verify the Secondary Payloads Avionics flight hardware and associated Ground Support Equipment (GSE) from handover through ground processing, launch, and ascent/flight and disposal. The data supports SPIE input to the Cross-Program OMR Management System (OMS) via Requirements Change Notice (RCN) to GSDO as governed by the Joint Integration Control Board (JICB). The OMR also details the constraints and limitations for transportation, assembly, integration, and checkout of the Secondary Payloads Avionics with the Integrated Spacecraft and Payload Element (ISPE) as part of the SLS. OMRs do not duplicate design, construction, assembly, installation and quality requirements defined by released engineering products (e.g. drawings, models, ICDs, IRDs, Standards, Specifications, etc.), although they may supplement them in certain cases.

8. **OPR**: EO40 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**: Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: Final as part of the Acceptance Data Package (ADP); update as required

13. **REMARKS**: Support required includes resolving action items, providing the technical basis for incorporating submitted requirements, and working to create integrated/shared requirements.

14. **INTERRELATIONSHIP**: SOW paragraph 3.3

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Ground Operations and Maintenance Requirements (OMR) includes the processing requirements beginning at acceptance through transport to Marshall Space Flight Center (MSFC), receiving at MSFC, offline processing, installation in MSA, transport to Kennedy Space Center (KSC), and Vehicle Assembly Building (VAB) integrated operations ground processing and integration with SLS.

15.2 **APPLICABLE DOCUMENTS**: None

15.3 **CONTENT**: The Ground Operations and Maintenance Requirements (OMR) shall be derived from the design, which will follow the Concept of Operations (CONOPs) and shall be delivered with supporting rationale necessary to describe the intent and justification behind generating the requirement, along with any consequences for not performing the OMR. Each OMR shall cover the following (if applicable):

a. Consumable loading constraints, techniques, and sequences.
b. Transportation, Storage, & Handling specifications.
c. Lifting & Handling specifications.
d. ISPE integration constraints and/or limitations.
e. Identification of integration phase for when requirement should be implemented (Transportation & Storage, Offline Processing, VAB pre-stacking, VAB post-stacking, Closeout, Rollout, etc.).
f. Access Requirements to include location.
g. Prior to launch maintenance data.
h. Remove before flight closeout tasks including cover removal/installation, photography requirements, TPS installation, etc.
i. Launch operation checkout criteria.

DRD Continuation Sheet

TITLE: Ground Operations and Maintenance Requirements (OMR) **DRD NO.**: 1537OP-001
DATA TYPE: 3 **PAGE**: 2/2

15. **DATA PREPARATION INFORMATION (CONTINUED):**
    - j. Constraints and/or limitations during ground handling, integration/installation and launch preparation.
    - k. Identification of any related hazardous operations and related control s with reference to associated hazard reports, FMEA/CILs, and LCCs.
    - l. Any test requirements post-delivery to KSC.
    - m. Any field site LRU/component installation requirements and drawings.
    - n. Any retest requirements needed to restore the stage to a certified state, post LRU Remove and Replace.
    - o. Touch-Point requirements.
    - p. Internal access equipment installation and removal requirements.
    - q. Internal access GSE and FOD prevention attach point locations.
    - r. Keep out zone requirements.
    - s. Walk-down checklist activities and final closeout requirements.

15.4 **FORMAT**: Contractor format is acceptable. However, the data shall be delivered in an editable format.

15.5 **MAINTENANCE**: Changes shall be incorporated by complete reissue with changes redlined.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537QE-001**
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/1

6. **TITLE:** Certificate of Qualification (COQ)

7. **DESCRIPTION/USE:** To provide a uniform method for design qualification and certification of components and subsystems of a spacecraft system and Ground Support Equipment.

8. **OPR:** QD22 9. **DM:** FP30

10. **DISTRIBUTION:** Per Contracting Officer's letter

11. **INITIAL SUBMISSION:** Final COQ shall be submitted as part of the Qualification Unit Deliver Review data package and Acceptance Data Package (ADP)

12. **SUBMISSION FREQUENCY:** Single delivery as part of Acceptance Data Package (ADP)

13. **REMARKS:** The identification of items to be certified shall be based upon risk analysis assessment using processes such as Failure Modes and Effects Analysis (FMEA)/Critical Items List (CIL) analysis, Hazards analysis, and/or engineering analysis. An effective implementation of COQ processes and its documentation will help that the design is qualified to meet the system and mission requirements.

14. **INTERRELATIONSHIP:** SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The Certificate of Qualification (COQ) document and the supporting verification data is the information used by MSFC to accept a given design as qualified to meet end item and various subsystem requirements (environmental, performance, and design parameters) and its supporting documentation. Design Qualification and Certification documentation includes all documents detailing testing, engineering analysis, and/or similarity analysis or all of these together to qualify a complex system.

15.2 **APPLICABLE DOCUMENTS:** None

15.3 **CONTENTS:** The Certificate of Qualification (COQ) shall contain the Configuration Item (CI) nomenclature, part number, and specification number and an index of all the verification data and other data applicable to the Certificate. The COQ shall be signed by the developing contractor/organization's Program/Project Manager, Chief Engineer (or Head of Systems Engineering), and the Quality Organization. MSFC corresponding organizations shall sign as accepting the certificate and supporting data as valid and in conformance with contract requirements. Supporting documentation referenced in the COQ shall provide objective evidence that the subject component/subsystem has met all specified certification requirements and shall be available for review upon government request. The hardware subject to COQ shall meet design qualification requirements per NASA and program specific system and mission requirements.

15.4 **FORMAT:** The contractor shall use MSFC Form 511 or equivalent for the format of COQs.

15.5 **MAINTENANCE:** COQs and supporting documents shall be updated and maintained current as required by design, test, and manufacturing changes for the life of the program.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537QE-002**
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1

6. **TITLE:** Log Books

7. **DESCRIPTION/USE:** To document the activities and operations performed on selected deliverable hardware when specified by drawing or contract.

8. **OPR:** QD22 9. **DM:** FP30

10. **DISTRIBUTION:** The Equipment Log Books shall be delivered and remain with the equipment.

11. **INITIAL SUBMISSION:** As part of the Qualification Unit Delivery Review data package and Acceptance Data Package (ADP)

12. **SUBMISSION FREQUENCY:** Single delivery as part of Acceptance Data Package (ADP)

13. **REMARKS:** The Log Books shall be delivered and remain with the deliverable hardware.

14. **INTERRELATIONSHIP:** SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The Log Books document the activities and operations performed on deliverable hardware.

15.2 **APPLICBALE DOCUMENTS:** None

15.3 **CONTENT:** The Log Book(s) shall contain the information identified in MSFC Form 3473.

15.4 **FORMAT:** Use MSFC Form 3473 or equivalent with MSFC approval. Contractor may propose electronic log book(s) or similar contractor approach provided specified content is incorporated, data remains accessible, and log book accompanies the hardware and can be edited to update activities and operations after hardware delivery in support of life tracking.

15.5 **MAINTENANCE:** The Log Book shall be maintained until turnover with the ADP.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537RM-001**
3. **DATA TYPE**: 1/2
4. **DATE REVISED**:
5. **PAGE**: 1/2

6. **TITLE**: Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)

7. **DESCRIPTION/USE**: Failure Modes and Effects Analysis (FMEA) – to identify and document the possible failures modes and causes of each hardware item of a subsystem/system, the worst case effect of such failures for each mission phase and assigns criticality per the applicable FMEA/CIL guidelines document. This information is vital for design improvements, reliability, and maintainability analysis. The FMEA provides a means for systematic identification of failure modes and their resulting effects for evaluation and identifies critical single failure points for possible elimination from the design.

   Critical Items List (CIL) – to identify and document the list of critical failure modes of item(s) in each subsystem/system with potential worst case effect(s), such as Loss of Crew (LOC), Loss of Vehicle (LOV), and/or Loss of Mission (LOM) or detrimental failure effects as applicable to the system under study per the applicable FMEA/CIL guideline document. The CIL provides details of relevant design features, testing, inspections, processes, and controls, as applicable to the failure mode, to mitigate/minimize risk. CIL retention rationale bridges the gap in the design, test/verification requirements, inspection, and process controls. The CIL also facilitates the identification of Government Mandatory Inspection Points as well as provides supplementary data to support the hazard analysis.

8. **OPR**: QD22 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**: **FEMA**: As part of Critical Design Review (CDR) data package - Draft consistent with design maturity. Baseline not later than 30 days prior to Final Acceptance Review. **CIL**: As part of Critical Design Review (CDR) data package – Initial draft preliminary retention rationale. Baseline not later than 30 days prior to Final Acceptance Review.

12. **SUBMISSION FREQUENCY**: After baseline; update as required

13. **REMARKS**: FMEA is a type 2 document and will be submitted separately from the CIL. CIL is a type 1 document and will be submitted separately from the FMEA.

14. **INTERRELATIONSHIP**: DRD 1537SA-001, *System Safety/Hazard Analysis Reports*. SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: FMEA/CIL will be performed for all flight and ground hardware/software within the scope of the SLS program requirements documented in SLS-RQMT-014 and SLS-RQMT-016.

15.2 **APPLICABLE DOCUMENTS**:

SLS-RQMT-014	*Space Launch System S&MA Requirements Document*
SLS-RQMT-016	*Space Launch System Program Failure Modes and Effects Analysis/Critical Items List (FMEA/CIL) Requirements*

15.3 **CONTENT**: The FMEA/CIL shall be prepared in accordance with applicable document listed in 15.2.

DRD Continuation Sheet

TITLE: Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)

DRD NO.: 1537RM-001

DATA TYPE: 1/2

PAGE: 2/2

15. **DATA PREPARATION INFORMATION (CONTINUED):**

15.4 **FORMAT**: Contractor format for FMEA and CIL worksheets is acceptable after concurrence by MSFC S&MA. For milestone reviews, FMEA/CIL report shall be submitted in searchable PDF electronic format. FMEA/CIL data shall be submitted in flat file electronic format along with each report submittal.

15.5 **MAINTENANCE**: The FMEA/CIL shall be maintained current and updated based on design changes, flight and test experiences. Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537RM-002**
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. PAGE: 1/2

6. **TITLE:** Reliability Analysis Report

7. **DESCRIPTION/USE:** To describe the reliability data and analysis used to assess the reliability of the avionics system.

8. **OPR:** QD22 9. **DM:** FP30

10. **DISTRIBUTION:** Per Contracting Officer's letter

11. **INITIAL SUBMISSION:** Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY:** Final as part of the Acceptance Data Package (ADP); update as required

13. **REMARKS:**

14. **INTERRELATIONSHIP:** DRDs 1537RM-001, *Failure Modes and Effects Analysis and Critical Items List* and 1537SA-001, *System Safety/Hazard Analysis Report*. SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The Reliability Analysis Report assesses the quantitative component/subsystem reliability using established tools and techniques.

15.2 **APPLICABLE DOCUMENTS:**

SLS-RQMT-014	*Space Launch System Program Safety and Mission Assurance (S&MA) Requirements*
SLS-PLAN-047	*Space Launch System Program Technical Metrics Plan*

15.3 **CONTENT:** The Reliability Analysis Report shall be prepared in accordance with documents listed in 15.2 and include the following:

a. The Reliability Analysis Report data is obtained from failure modes and failure rate information based on generic sources, system specific failure histories, expert opinion, and physics of failure of various mechanisms (as applicable) to develop component failure probability distributions. A Reliability Analysis shall be performed for all flight hardware. The documentation of each analysis shall provide:
   1. A description of the approach used in conducting the reliability analyses.
   2. Ground rules and assumptions used in performing the individual reliability analysis.
   3. The method used in determining reliability estimates.
   4. Listing of data, data sources and references used in the analyses that will allow for independent reconstruction of the reliability estimates.
   5. The method of calculation for the reliability estimates. This shall include but not be limited to:
      (a) Predicted number of cycles or estimated time.
      (b) Specify if estimates are based on per hour, per cycle or per demand.
      (c) Specify operational phases (ground and flight).
      (d) Specify anticipated environment.
   6. Estimated component failure rate or life distribution (as appropriate) in time or cycles.
   7. Estimates of the uncertainty of the failure probabilities using Bayesian methods to quantify uncertainty when applicable. The result shall be in the form of posterior probability distributions. These may be specified as a distribution model (probability distribution function) along with the parameters necessary to completely specify the model (i.e., Lognormal, 5^{th}, mean, 95^{th} percentile). If the Bayesian method is not used, the method selected shall be fully explained and concurred with by MSFC.

DRD Continuation Sheet

TITLE: Reliability Analysis Report **DRD NO.:** 1537RM-002
DATA TYPE: 3 **PAGE:** 2/2

15. **DATA PREPARATION INFORMATION (CONTINUED):**

15.4 **FORMAT**: Contractor format is acceptable. For milestone reviews, the Reliability Analysis Report shall be submitted in searchable PDF electronic format.

15.5 **MAINTENANCE**: Analyses and documentation shall be maintained so as to be consistent with the design configuration and the data specified for inclusion in the iterations. Analyses shall be maintained current based on various design changes, flight and test experiences. Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537RM-003**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/1

6. **TITLE**: Limited Life Items List

7. **DESCRIPTION/USE**: To provide a list of items possessing limited life characteristics, and their designed or allowed usage.

8. **OPR**: QD22 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**: Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: Final as part of the Qualification Unit Delivery Review data package and Acceptance Data Package (ADP); update as required

13. **REMARKS**:

14. **INTERRELATIONSHIP**: SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Limited Life Items List provides a list depicting items of hardware categorized as having "limited life," i.e., items having characteristics of quality degradation or drift with age or use.

15.2 **APPLICABLE DOCUMENTS**: None

15.3 **CONTENT**: The Limited Life Items List shall contain the following for those items identified as time, cycle, or age sensitive:

a. Name of item.
b. Lot number and Part number.
c. Allowable time and/or cycles and age permitted.
d. Accumulated time and/or cycles at time of shipment.
e. Required time and/or cycles and age that must be remaining prior to conducting each major milestone test and launch.
f. Action required at end of life (e.g., remove and replace, calibrate, inspect, etc.).

15.4 **FORMAT**: Contractor format is acceptable.

15.5 **MAINTENANCE**: Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537SA-001**
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/2

6. **TITLE:** System Safety/Hazard Analysis Reports

7. **DESCRIPTION/USE:** To document the Hazard Analysis results which identify hazardous conditions, identifies the risk, identifies the controls and identifies the verifications created in cooperation with engineering to prevent the occurrence of those conditions. The documents will contain the results of the Hazard Analyses, which include the data required by the SLS S&MA requirements (e.g. hazard reports). The documents will provide a complete safety analysis of the flight hardware, ground support equipment, and applicable ground operations. The analyses provide status of the resolution of potential safety risks and the supporting risk acceptance rationale for any hazards that are not eliminated. The analyses will support SPIE Element milestone reviews and their evaluation of compliance with the applicable safety requirements, including the failure tolerance requirement.

8. **OPR:** QD22 9. **DM:** FP30

10. **DISTRIBUTION:** Per Contracting Officer letter

11. **INITIAL SUBMISSION:** As a part of Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY:** Final as a part of Acceptance Review (AR) data package; update as required

13. **REMARKS:** Reference is made to NPD 8700.1, *NASA Policy for Safety and Mission Success* and NASA-STD-8719.13, NASA Software Safety Standard. The Hazard Analyses shall be updated as the hardware design progresses, providing continuity and covering the interrelated areas of design, operations, and integration.

14. **INTERRELATIONSHIP:** DRD 1537RM-001, *Failure Modes Effects Analysis and Critical Items List.* SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The System Safety/Hazard Analysis Reports (SSARs) will identify hazards, document the methods used for controlling the hazards, support the risk management process, establish control and verification methods and ensure closure of all identified hazards. The SSARs will provide a total assessment of the subject systems (flight/ground hardware and software) and their operational environment. The analysis shall cover the entire life cycle from concept definition through contract completion and hardware disposal.

15.2 **APPLICABLE DOCUMENTS:**

NPR 8000.4	*Risk Management Procedures and Guidelines*
NPR 8715.3	*NASA Safety Manual*
SLS-RQMT-015	*Space Launch System Program Hazard Analysis Requirements*

15.3 **CONTENT:** The System Safety/Hazard Analysis Reports (SSARs) shall identify hazards, document the methods used for controlling the hazards, support the SPIO Element risk management process, and establish hazard control and verification methods applicable to design, development, manufacturing and assembly, testing, inspection, integration, and flight (of subject systems) including any ground support equipment (GSE), facilities, and ground operations in accordance with the Applicable Documents in noted in 15.2. Use of other required S&MA analyses such as the FMEA/CIL, which is used to support the hazard analysis, shall be linked in the applicable hazard report.

a. The reports shall be structured in compliance with SLS-RQMT-015. Any special analysis efforts established by internal SPIE agreements shall also be documented. The flight and ground hazard analysis reports shall be organized in two separate volumes to permit each volume to be revised and approved separately.

DRD Continuation Sheet

TITLE: System Safety/Hazard Analysis Report **DRD NO.:** 1537SA-001
DATA TYPE: 1 **PAGE:** 2/2

15. **DATA PREPARATION INFORMATION (CONTINUED):**

b. The analysis shall address the total avionics system, including the applicable flight and ground hardware and related software.

c. The SSARs shall contain, as a minimum, the data required to support SPIO Element milestone reviews. This includes the results of the required versus available level of fault tolerance and applicable supporting analysis tools such as a fault tree. Note: This does not mandate that a fault tree be developed and used, only that the use of any such analysis tools be documented in the SSAR.

15.4 **FORMAT**: The analyses shall be provided in an electronic format compatible with the SLS Program's Hazard Database as specified in SLS-RQMT-015.

15.5 **MAINTENANCE**: The Hazard Analyses shall be updated as the hardware design progresses, providing continuity and covering the interrelated areas of design, operations, and vehicle subsystem integration.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537SA-002**
3. **DATA TYPE**: 2
4. **DATE REVISED**:
5. **PAGE**: 1/3

6. **TITLE**: Off-site Safety, Health, and Environmental (SHE) Plan

7. **DESCRIPTION/USE**: A Contractor generated document that describes the Contractor's specific approaches and methods to establish and maintain an acceptable safety, health and environmental program and ensures the work performed by the Contractor at a location other than the Center [Marshall Space Flight Center (MSFC) or Michoud Assembly Facility (MAF)] over the duration of this contracted effort is in full compliance with the Federal, State, local, National Aeronautics and Space Administration (NASA) and when applicable Center specific SHE-related requirements and regulations identified in the Applicable Documents listed in section 15.2, in accordance with NFS 1852.223-73.

8. **OPR**: AS10/QD12 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's (CO) letter

11. **INITIAL SUBMISSION**: As requested/required by the CO

12. **SUBMISSION FREQUENCY**: After initial submission, when any new/revised proposed or previously approved SHE Plan is requested or required by the CO, Contracting Officer's Representative (COR), solicitation/award, or is otherwise required.

13. **REMARKS**:

14. **INTERRELATIONSHIP**: FAR 52.223-3, *Hazardous Material Identification and Material Safety Data*, MSFC 52.223-91, *Hazardous Materials Reporting*, NFS 1852.223-70, *Safety and Health;* NFS 1852.223-72, *Safety and Health (Short Form)*; NFS 1852.223-73, *Safety and Health Plan*; NFS 1823.223-74, *Drug-and Alcohol-free Workforce*. DRD 1537SA-003, *Off-site Mishap and Safety Statistics Report*. SOW paragraph 2.3

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Safety, Health, and Environmental (SHE) Plan will describe the specific approaches and methods the Contractor will implement for planning, controlling and enforcing their industrial safety, occupational health, and environmental requirements over the duration of this contracted effort while also ensuring compliance with the Federal, State, Local, NASA and with applicable Center specific SHE-related requirements.

15.2 **APPLICABLE DOCUMENTS**: Code of Federal Regulations (CFR) and listed consensus standards are applicable to all contracts. NASA and Center documents and Center specific requirements are applicable to all contracts to the extent identified or referenced in the contract.

29 CFR Part 1910	*Department of Labor; Occupational Safety and Health Administration Standards for General Industry*
29 CFR Part 1926	*Department of Labor; Occupational Safety and Health Administration Standards for Construction Industry*
CFR Title 40 Parts 1-1068	*Protection of Environment*
ANSI Standards applicable to the scope of this contract	
NFPA Standards	*National Fire Codes*
Executive Order 13423	Strengthening Federal Environmental, Energy, and Transportation Management
Executive Order 13514	*Federal Leadership in Environmental, Energy, and Economic Performance*
NPR 3792.1	NASA's *Plan for a Drug-Free Workplace*
NPR 8000.4	*Agency Risk Management Procedural Requirements*
NPR 8621.1	*NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping*

DRD Continuation Sheet

TITLE: Off-site Safety, Health, and Environmental (SHE) Plan **DRD NO.:** **1537SA-002**
DATA TYPE: 2 **PAGE:** 2/3

15. **DATA PREPARATION INFORMATION (CONTINUED):**

NPD 8700.1	*NASA Policy for Safety and Mission Success*
NPR 8715.1	*NASA Occupational Safety and Health Programs*
NPR 8715.3	*NASA General Safety Program Requirements*
MWI 8621.1	*Mishap and Close Call Reporting and Investigation Program*

NOTE: The NPD/NPR/MPD/MPR/MWI documents can be accessed through the Marshall Integrated Document Library (MIDL) located on the MSFC "Inside Marshall" Webpage.

a. The documents listed herein contain Center specific requirements to which the Contractor's work must conform. The Contractor shall comply with all Center specific requirements identified as applicable to the work being performed by the Contractor and all revisions thereto. Current revisions shall be utilized, unless authorization to use obsolete revisions has been properly documented. This listing is not intended to relieve the Contractor of its responsibility for identification of applicable regulations and procedures and compliance therewith when performing work offsite for MSFC or MAF.

b. If work is expected to be performed at MSFC, MAF or another NASA Center the Contractor shall contact the Center's Safety and Mission Assurance (S&MA) Directorate/Office where the work is expected to be performed prior to commencing any work. The Contractor shall become aware of the Center's specific requirements and processes for the type work being performed and ensure all work performed by the Contractor complies with the Center's requirements.

15.3 **CONTENTS**: The Contractor's Safety, Health, and Environmental (SHE) Plan shall be written specifically for the work to be performed over the duration of this contracted effort. The plan shall provide a clear and adequate description of the Contractor's approach for ensuring the work performed by the Contractor is in full compliance with Federal, State, NASA, Center specific SHE-related requirements and regulations identified in the Applicable Documents listed in section 15.2, Center SHE Core Program Requirements (CPRs) while implementing each of the following SHE CPRs at their worksite. (**NOTE 1**: A Contractor's corporate SHE plan is not considered as being written specifically for the work to be performed under this contracted effort at their worksite and will not be considered by the Center as fulfilling this DRD requirement.) (**NOTE 2**: Contractors shall maintain documentation where required for any sub-element of the CPRs and provide to the Government, upon request.) (**NOTE 3**: The Government reserves the right to periodically inspect contractor worksite with or without prior notice to the Contractor.) (**NOTE 4**: The Government assumes no liability or responsibility for the Contractor's compliance or non-compliance with any Federal, State, NASA or Center specific requirements or regulations.) (**NOTE 5**: Fines and additional costs for violations levied against the Contractor as a result of OSHA findings, and/or installation safety, health or environmental are the sole responsibility of the Contractor and cannot be passed through to the Government.) (**NOTE 6**: The Contractor is responsible for the safety and health of all subcontractor employees directly supporting the Contractor over the duration of this contracted effort.)

a. CPR 1 - Management Leadership and Employee Involvement:
   1. Provide a visible management commitment, policy and culture that value the safety and health of employees.
   2. Provide safe and healthful working conditions that are free from recognized hazardous conditions and free from incidents and injuries.
   3. Protect Government property and the environment over the duration of this contracted effort.
   4. Encourage employees to participate, be involved and engaged in their SHE Program.
   5. Hold managers and employees accountable to understand their roles and responsibilities in their SHE Program.
   6. Evaluate the safety performance of subcontractors/teammates prior to their selection, when applicable.
   7. Flow down requirements and responsibilities contained in this contract to subcontractors/teammates over the duration of this contracted effort, when applicable.
   8. Provide SHE meetings and awareness training to employees regularly and document.
   9. Maintain the SHE plan current with contract and NASA requirements, review and update as necessary.

DRD Continuation Sheet

TITLE: Off-site Safety, Health, and Environmental (SHE) Plan DRD NO.: **1537SA-002**
DATA TYPE: 2 PAGE: 3/3

15. **DATA PREPARATION INFORMATION (CONTINUED):**

b. CPR 2 - Worksite Analysis:
   1. Perform worksite safety inspections, as required by OSHA, and document these inspections.
   2. Encourage employees to report any conditions that they feel are hazardous or unsafe without the fear of reprisal from management.
   3. Report all NASA reportable mishaps and close calls that occur in support of this contracted effort. Investigate within the timeline specified by the Center's Appointing Office to determine the cause(s). Develop a Mishap Investigation Report at the completion of the investigation and provide to the Center's Safety Office or enter directly into the NASA Mishap Information System (NMIS). Develop a Corrective Action Plan (CAP) and submit for concurrence within the timeline specified by the Center's Appointing Official. Implement track corrective actions and track to closure. Provide CAP status/updates directly into NMIS or to the Center's Safety Office not to exceed 30 calendar day intervals from the date of concurrence until the CAP is closed. (**NOTE**: See DRD 1537SA-003, *Off-site Mishap and Safety Statistics Report* and NPR 8621.1 for more information.)
   4. Perform post-mishap drug and alcohol testing when the initial mishap investigation provides reason to believe an employee's actions or failure to perform a required action is reasonably suspected of having caused or contributed to causing the mishap. (See NPR 3792.1 and NPR 8621.1 for more information.)

c. CPR 3 - Hazard Prevention and Control:
   1. Implement an emergency management program at the worksite for the all types of emergencies that can occur during this contracted effort (e.g., fire, chemical spill, accidents, or natural disasters).
   2. Provide safety, health, and environmental services at the worksite that are applicable to this contracted effort.

d. CPR 4 - Safety, Health and Environmental Training:
   1. Provide training to employees so that they are informed, knowledgeable and are able to identify and recognize hazardous conditions in the workplace and the signs and symptoms of workplace-related illnesses, understand the safe work practices and procedures to be used in the workplace, and are empowered and authorized to "stop or halt" any activity when they have reason to suspect the activity is being performed in an unsafe or unhealthy manner, and document this training was provided.
   2. Communicate to all employees the Contractor's disciplinary policy/program, so that each employee fully understands the actions that can be taken when an employee is discovered not following safety, health, and environmental policies, procedures and rules, and disciplinary actions are warranted, and how the Contractor's disciplinary policy/program is flowed-down to subcontractors/teammates over the duration of this contracted effort, when applicable, and document this training was provided
   3. Evaluate operations/jobs to identify the specific training required by OSHA for employees and provide the specific training to employees prior to them performing the operation/job, and document this evaluation.

e. CPR 5 - Environmental Management System: A description of how the contractor ensures compliance with Federal, State and Local environmental laws and regulations, CFR Title 40 Parts 1-1068, Executive Orders 13423 and 13514 for:
   1. Implementing and reporting green procurements.

15.4 **FORMAT**: The Contractor's SHE plan is to be written in a format that follows the order of the SHE CPRs as they are shown in section 15.3 or the Contractor is to provide a matrix that clearly links where each SHE CPR sub-element is adequately addressed in the contractor's SHE Plan. The Contractor's SHE plan that is submitted in accordance with this DRD shall be written specifically for the work being performed by the Contractor in support of this contracted effort. (See NOTE in section 15.3, Contents.)

15.5 **MAINTENANCE**: Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537SA-003**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. **PAGE**: 1/2

6. **TITLE**: Off-site Mishap and Safety Statistics Reports

7. **DESCRIPTION/USE**: To provide initial and follow-up reporting of mishaps, close calls, serious non-occupational injuries or illnesses, and Contractor quarterly safety metrics to the Government for Contractors that are physically located Off-site or at another National Aeronautics Space Administration (NASA) Center.

8. **OPR**: QD12 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**:
    a. **Safety Statistics** specific to this contracted effort shall be submitted by the end of the first quarter (calendar year) after Authority to Proceed (ATP) or contract award. The safety statistics submitted by the Contractor shall be for the work performed by the Contractor for the previous quarter. Contractors shall submit the quarterly safety statistics to the Center's Safety Office. At MSFC to the MSFC Industrial Safety Branch/QD12. At MAF to the MAF Safety and Mission Assurance (SMA) Manager/QD10, unless directed to send it to the MSFC Industrial Safety Branch/QD12. (NOTE: If the work is performed on another NASA Center provide a copy to the Center's Safety Office, if requested.)
        1. Safety statistics shall be reported using MSFC Form 4371 or an equivalent electronic notification system that includes all of the information listed in 11.a.2.
        2. Safety statistics reports shall include: contract number, subcontractors, North American Industry Classification System (NAICS) codes and the following for the reporting period: number of employees, number of supervisors, hours worked, and number of injuries including days away from work and/or first-aid cases, number of incidents involving NASA related equipment or property damage. (NOTE 1: The safety statistics report includes all work performed in direct support of this NASA or MSFC contracted effort where the Contractor is charging man-hours to NASA or MSFC in direct support of this contract.)
    b. **Initial reporting of a NASA reportable mishap/close call defined in NPR 8621.1.**
        1. **Type A, Type B, and High-Visibility Mishaps/Close Calls** specific to this contracted effort shall be made as soon as possible after initiating emergency response, but **no later than 1 hour** of occurrence or awareness by one of the following methods:
            a. Call the MSFC Safety Hotline (256) 544-0046. (NOTE: If the work is being performed on another NASA Center also notify that Center's Safety Office within the same timeline.)
            b. Direct input into the NASA Mishap Information System (NMIS) by the Contractor's designated NMIS representative at http://nmis.sma.nasa.gov. Contact the Center's Safety Office for assistance if needed. (See section 11.f.)
        2. **Type C, Type D, and Low-Visibility Mishaps/Close Calls** specific to this contracted effort shall be reported by use of the MSFC Safety Statistics Report (MSFC Form 4371) that is submitted quarterly.
    c. **Initial reports for a NASA reportable mishap/Close Call listed in 11.b.1** specific to this contracted effort shall include the following: location and time of incident, number of fatalities, number hospitalized, type of damage, estimated cost, brief description, and contact person's name and phone number. (See NPR 8621.1.)
    d. **Follow-up reporting for a NASA reportable mishap/close call listed in 11.b.1 shall**:
        1. Be investigated within the timeline specified by the Center's Appointing Official (investigation for these type mishaps/close calls do not to exceed 75 calendar days unless additional time is granted by the Center's Appointing Official).
        2. Have a Mishap Investigation Report developed at the completion of the investigation and entered directly into NMIS or submitted to the Center's Safety Office (At MSFC, the Industrial Safety Branch/QD12 or MAF, the S&MA Manager/QD10.) (See NPR 8621.1.)

DRD Continuation Sheet

TITLE: Off-site Mishap and Safety Statistics Reports DRD NO.: **1537SA-003**
DATA TYPE: 3 **PAGE**: 2/2

11. **INITIAL SUBMISSION (CONTINUED):**
    3. Have a Corrective Action Plan (CAP) developed and submitted for concurrence within the timeline specified by the Center's Appointing Official upon Endorsing Official approval. (See NPR 8621.1.)
    4. Provide CAP status/updates into NMIS or to the Center's Safety Office not to exceed 30 calendar day intervals from the date of concurrence until the CAP is closed. (See NPR 8621.1.)

    e. **Safety Concerns, Hazards, and non-reportable mishaps** for Contractors working **on another NASA Center** shall be reported to that Center's Safety Office in accordance with that Center's reporting requirements. (See NPR 8715.1.)

    f. **Contractor NMIS Representative** shall be identified to enter, track and close Contractor mishaps/close calls entered in NMIS. After contract award the contractor shall contact the Center's NMIS Administrator or Center's Mishap Investigation Program Manager located in the MSFC Industrial Safety Branch for access to the NMIS database.

12. **SUBMISSION FREQUENCY**: Safety Statistics (MSFC Form 4371 or an equivalent electronic submittal) - By the end of the first quarter (calendar year) after Authority to Proceed (ATP) or contract award and submitted quarterly thereafter by the 10th day of the month following the end of the quarter to MSFC Industrial Safety Branch. A copy can also be sent to the Center's Safety Office if requested. Mishaps: As specified in section d of this DRD until the NMIS case is closed.

13. **REMARKS**: Data type 3 applies to Mishap and Safety Statistics. Government approval/endorsement of Mishap Investigations reports is conducted in accordance with NPR 8621.1 or MWI 8621.1 when requested.

14. **INTERRELATIONSHIP**: DRD 1537SA-002, *Off-site Safety, Health, and Environmental (SHE) Plan*. SOW paragraph 2.3

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE**: For the Government to be notified by the Contractor of all Contractor mishaps, close calls, and serious non-occupational injuries or illnesses as required in NPR 8621.1.

15.2 **APPLICABLE DOCUMENTS**:

NPR 8621.1	*NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping*
MWI 8621.1	*Mishap and Close Call Reporting and Investigation Program*

15.3 **CONTENTS**: Initial and follow-up mishap reports shall contain all information required by NPR 8621.1 and MWI 8621.1. Mishap and Safety Statistics Reports shall contain the information listed in 11.a.2 and on the MSFC Form 4371or equivalent electronic format.

15.4 **FORMAT**: The following formats or electronic equivalent shall be submitted:
- a. MSFC Form 4371, "*MSFC Contractor Accident and Safety Statistics*" or an equivalent electronic notification system that provides all necessary information listed in 11.a.2.
- b. Mishap Investigation Board Report using the format provided in NPR 8621.1.
- c. Additional Information submittal per MWI 8621.1.

15.5 **MAINTENANCE**: None required

15.6 **DEFINITIONS**: See NPR 8621.1 for NASA Mishap definitions.
Off-site. Work is physically located at a facility or on property that is **not owned or controlled by MSFC**. This is normally considered as a Contractor owned facility or property or other NASA Center.

On-site. Work is physically located at MSFC, MAF or on property that is **owned or controlled by MSFC**.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537SE-001**
3. **DATA TYPE**: 2
4. **DATE REVISED**:
5. **PAGE**: 1/2

6. **TITLE**: Verification/Validation Planning (VVPLAN)

7. **DESCRIPTION/USE**: To document the verification/validation approach, verification/validation activities, and organizations necessary to define and execute the project's verification/validation program.

8. **OPR**: EE11 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**: Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: Final as part of the Acceptance Data Package (ADP); update as required

13. **REMARKS**: Reference is made to NASA/SP-2007-6105, *NASA Systems Engineering Handbook*, MPR 7123.1, *MSFC Systems Engineering Processes and Requirements*, MSFC-HDBK-3173, *MSFC Project Management and Systems Engineering Handbook*, MSFC-HDBK-2221, *Verification Handbook, Volume II: Verification Documentation Examples*. Volume II provides examples of verification documentation that can be used as a guide in the development of or in the assessment of similar documentation. Verification/Validation planning documents developed to address specific verification activities (e.g., test plans, analyses plans, inspection plans, etc.) shall be acceptable as long as the respective content of the data meets that identified in CONTENTS (Item 15.3) and the submission of the collective data meets that identified in INITIAL SUBMISSION/SUBMISSION FREQUENCY (Items 11 & 12).

14. **INTERRELATIONSHIP**: DRD 1537SE-002, *Verification/Validation Requirements*. SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Verification/Validation Planning (VVPLAN) information provides a detail description of the project's verification/validation approach and structure for implementing the verification/validation program, as well as detail descriptions for the planned verification/validation requirements. The Verification/Validation Plan will address both hardware and software efforts. Software verification/validation planning requirements are contained in MPR 7150.1.

15.2 **APPLICABLE DOCUMENTS**:

MPR 7150.1 *MSFC Software Engineering Requirements*

15.3 **CONTENTS**: The Verification/Validation Planning (VVPLAN) information shall include the following:

a. Overview of the project's verification/validation program (i.e., qualification/acceptance vs. proto-flight, verification/validation of spares, refurbishment/reverification/revalidation plans).
b. Description of the project's organizational structure for implementing the verification/validation program (i.e., organization's involved in component vs. system tests, review and signoff authority for compliance data).
c. Detail preliminary descriptions of all verification/validation activities (i.e., tests, analyses, inspections, etc.) to be performed based on the identified verification/validation requirements. Identify any prerequisites, constraints, and objectives for all the verification/validation activities.
d. Detail time correlated sequence of verification/validation activities.
e. Description and planned usage of the support equipment, software, facilities, and tooling necessary to execute the verification/validation activities.

DRD Continuation Sheet

TITLE: Verification/Validation Planning (VVPLAN) **DRD NO.:** **1537SE-001**

DATA TYPE: 2 **PAGE:** 2/2

15. **DATA PREPARATION INFORMATION (CONTINUED):**

15.4 **FORMAT**: Contractor format acceptable.

15.5 **MAINTENANCE:** Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537SE-002**
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/1

6. **TITLE:** Verification/Validation Reports (VVREP)

7. **DESCRIPTION/USE:** To report the results of the individual verification/validation activities.

8. **OPR:** EE11 9. **DM:** FP30

10. **DISTRIBUTION:** Per contracting officer's letter

11. **INITIAL SUBMISSION:** 30 days after completion of each identified verification/validation activity. Status shall be submitted as a part of the Critical Design Review (CDR) package.

12. **SUBMISSION FREQUENCY:** Once per verification/validation activity and final as part of the Qualification Unit Delivery Review data package and Acceptance Data Package (ADP).

13. **REMARKS:** Reference is made to NASA/SP-2007-6105, *NASA Systems Engineering Handbook,* MPR 7123.1, *MSFC Systems Engineering Processes and Requirements,* MSFC-HDBK-3173, *MSFC Project Management and Systems Engineering Handbook,* MSFC-HDBK-2221, *Verification Handbook, Volume II: Verification Documentation Examples.*

14. **INTERRELATIONSHIP:** DRD 1537SE-001, *Verification/Validation Planning.* SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The Verification/Validation Reports (VVREP) (e.g., as-run procedure, memo, assessment, test report, inspection report, analysis, etc.) identifies the data that documents the results of each individual verification/validation activity.

15.2 **APPLICABLE DOCUMENTS:** None

15.3 **CONTENTS:** The Verification/Validation Reports shall contain the following:

a. Conclusions and recommendations relative to success of the verification/validation activity.
b. Concurrence by the appropriate discipline (e.g. safety, thermal, structures, etc.).
c. Description of deviations from nominal results, failures, approved corrective actions and procedures, and retest.
d. Traceability back to the requirement and/or verification/validation success criteria.
e Copy of as-run procedure (as appropriate).
f. Identification of test configuration and any differences from the flight configuration.
g. Specific results of each procedure including automated test segments, each analysis, or other verification/validation activity.
h. Performance data, plots, and pictures (as appropriate).
i. Models used in analysis.

15.4 **FORMAT:** Contractor format is acceptable.

15.5 **MAINTENANCE:** Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537SE-003**
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1

6. **TITLE:** Verification/Validation Compliance (VVC) Assessment

7. DESCRIPTION/USE: To establish and document the detail success criteria for each of the verification/ validation planning activities.

8. **OPR:** EE11 9. **DM:** FP30

10. **DISTRIBUTION:** Per Contracting Officer's letter

11. **INITIAL SUBMISSION:** As the first verification/validation report is submitted as closure to a requirement

12. **SUBMISSION FREQUENCY:** Update, maintain, and report status throughout the project lifecycle. Final as part of the Acceptance Data Package (ADP).

13. **REMARKS:** Reference is made to NASA/SP-2007-6105, *NASA Systems Engineering Handbook,* MPR 7123.1, *MSFC Systems Engineering Processes and Requirements,* MSFC-HDBK-3173, *MSFC Project Management and Systems Engineering Handbook,* MSFC-HDBK-2221, *Verification Handbook, Volume II: Verification Documentation Examples.*

14. **INTERRELATIONSHIP:** DRD 1537SE-001, *Verification/Validation Planning.* SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** The Verification/Validation Compliance (VVC) Assessment information establishes the detail success criteria for each of the activities identified in the verification/validation planning.

15.2 **APPLICABLE DOCUMENTS:** None

15.3 **CONTENTS:** The Verification/Validation Compliance (VVC) Assessment shall contain the following:

a. Identification of the requirement(s) to be satisfied.
b. Identification of the verification/validation requirements associated with each of the requirements.
c. Identification and traceability of the verification/validation reports to each of the requirements.
d. Assessment of the verification/validation reports to determine compliance/non-compliance.
e. Identification of any non-conformances (e.g. waivers, deviations, discrepancy reports) against each of the requirements.

15.4 **FORMAT:** Contractor format is acceptable.

15.5 **MAINTENANCE:** Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.**: 1537 **ISSUE**: Draft
2. **DRD NO.**: **1537SE-004**
3. **DATA TYPE**: 3
4. **DATE REVISED**:
5. PAGE: 1/1

6. **TITLE**: Test and Checkout Procedures

7. **DESCRIPTION/USE**: To provide step-by-step instructions to perform test and checkout activities during the qualification, acceptance, and verification of the avionics units, as applicable. The "As Run" copy of a Test and Checkout Procedure (TCP) or Test Preparation Sheet (TPS) is used to record the results obtained from the test and provides a detailed documentation and history of test activities.

8. **OPR**: ES43 9. **DM**: FP30

10. **DISTRIBUTION**: Per Contracting Officer's letter

11. **INITIAL SUBMISSION**: Draft as a part of the Critical Design Review (CDR) data package

12. **SUBMISSION FREQUENCY**: Completed "as run" reports/TCP/TPS shall be submitted as part of the Qualification Unit Delivery Review data package and Acceptance Data Package (ADP); update as required

13. **REMARKS**:

14. **INTERRELATIONSHIP**: SOW paragraph 4.1

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The Test and Checkout Procedures will be prepared to control and document test and checkout activities during the qualification, acceptance, and verification of the avionics unit.

15.2 **APPLICABLE DOCUMENTS**: None

15.3 **CONTENTS**: Each Test and Checkout Procedures shall as a minimum contain the following:

a. Test Article Identification - A brief description of the article to be tested. This description should identify the configuration of the hardware to be tested as well as uniquely identify any software associated with the hardware.
b. Test Requirements - Identify the requirements for the test procedure. Include a cross reference of the step/sequence where each requirement is fulfilled to a requirement identified in a controlled document.
c. Test Setup - Identify the setup of the test hardware and software required to perform the test. Identify the configuration of any Ground Support Equipment, Special Test Equipment, test software, fixtures, or other test hardware used to perform the test including the calibration status where appropriate.
d. Prerequisites - List any requirements, processes, or other procedures that must be completed before performing each procedure.
e. Test Sequence - Identify the step-by-step sequence of events required to perform the procedure. Any deviations shall be recorded in the "As Run" copy of the TCP/TPS so that the actual sequence of events can be accurately reconstructed.
f. Test Results - Record the test results in the "As Run" copy of the TCP/TPS. Record the filename of any data recorded electronically in the "As Run" copy of the TCP/TPS. Any data files recorded electronically shall be delivered with the "As Run" copy of the TCP/TPS including any software required to read the data. Documentation of any non-conformances, their resolution, and any associated re-test shall be appended to the appropriate "As Run" copy of a TCP/TPS.
g. Safety - Identify the hazards associated with performing the test procedure. Include the methods and cautions by which the hazards shall be controlled and any required Personnel Protective Equipment.

15.4 **FORMAT**: Contractor format is acceptable.

15.5 **MAINTENANCE**: Changes shall be incorporated by complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.:** 1537 **ISSUE:** Draft
2. **DRD NO.:** **1537SE-005**
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Mass Properties Data
7. **DESCRIPTION/USE:** To submit the status of the contractor's mass properties, based on a uniform system of terminology and practice to enable technical management and system design.
8. **OPR:** EV74
9. **DM:** FP30
10. **DISTRIBUTION:** Per Contracting Officer's letter
11. **INITIAL SUBMISSION:** Draft as a part of the Critical Design Review (CDR) data package
12. **SUBMISSION FREQUENCY:** Final as part of the Acceptance Data Package (ADP); update as required
13. **REMARKS:**
14. **INTERRELATIONSHIP:** SOW paragraph 4.1
15. **DATA PREPARATION INFORMATION:**

15.1 **SCOPE:** Periodic mass estimates provide insight to the status of the mass estimates throughout all of its phases, and critical data to feed system design. Mass maturity (estimated, calculated, or actual) shall be provided at the system level. Totals of each of these categories shall be recorded to provide an indication of the system maturity. Full mass properties of all associated inert hardware is required. New hardware development shall include weight growth allocations, threats and opportunities and technical performance metrics. Data will be presented at major program review.

15.2 **APPLICABLE DOCUMENTS:** None

15.3 **CONTENT:** At a minimum, the Mass Properties Data shall include the following:

a. Mass summaries.
   1. Mass summary by function.
   2. Potential changes scored for likelihood (1-5) and predicted mass consequence. Mass change analysis.
   3. Mass changes since previous submittal.
   4. Pending changes.
   5. Mass Growth Allowance (MGA), per contractor depletion schedule.
   6. Identify System design features contained within data submittal.

b. At a minimum, the Mass Properties data shall include the following:
   1. Mass changes since previous submittal.
      (a) Pending changes.
      (b) Potential changes scored for likelihood (1-5) and predicted mass consequence.
   2. Mass summary by functional breakdown.

15.4 **FORMAT:** Contractor format is acceptable. Machine readable data files (ASCII data file, Excel spreadsheet, etc.) will be acceptable to MSFC. Documentation shall be provided to aid in the interpretation of the data files and shall include the description of units used, reference points for center of mass and moments/products of inertia and coordinate frames used.

15.5 **MAINTENANCE:** None required

ATTACHMENT J-3
SUBCONTRACTING PLAN (IF APPLICABLE)

ATTACHMENT J-4
SAFETY, HEALTH, AND ENVIRONMENTAL (SHE) PLAN

The approved On-site Safety, Health and Environmental (SHE) Plan, prepared in accordance with DRD 1537SA-002, dated *(TBD)*, and submitted after contract award, and any subsequent approved revisions during the term of this contract, is hereby incorporated into the contract by reference, with the same force and effect as if it were given in full text.

ATTACHMENT J-5
APPLICABLE DOCUMENTS

The documents listed herein contain specifications to which performance of the contract requirements and work described in Attachment J-1, Statement of Work and Attachment J-2, Data Procurement Document shall conform. The contractor shall comply with all the requirements of these documents and all revisions thereto. Current versions shall be utilized, unless authorization to use obsolete versions has been properly documented. This listing is not intended to relieve the Contractor of its responsibility for identification of applicable regulations and procedures and compliance therewith when performing work as described in Attachment J-1, Statement of Work and Attachment J-2 Data Procurement Document. The applicable documents may be found, but not limited to, the following URL locations below:

NASA Policy Directives (NPD) and NASA Procedural Requirements (NPR) can be found at the following URL: http://nodis3.gsfc.nasa.gov/

NASA and MSFC Standards can be found at the following URL: http://standards.nasa.gov

SLS Specification Requirements as amended and MSFC Procedural Requirements (MPR) are located in the Acquisition Planning Tool (APT) located at:

https://ec.msfc.nasa.gov/doing_business/
Select on Acquisition Planning Tool button on left
Select Secondary Payloads Avionics Box Development button in the middle
Select details button on right
Select APT supporting documents button in middle

ATTACHMENT J-5

APPLICABLE DOCUMENTS

DOCUMENT	DESCRIPTION
SLS-SPIE-RQMT-020	Spacecraft Payload Integration and Evolution Office Secondary Payload Deployment System Avionics Requirements
SLS-RQMT-019	Space Launch System Program (SLSP) Electrical, Electronic, and Electromechanical (EEE) Parts Management and Control Requirements Document
SLS-RQMT-016	Space Launch System Program Failure Modes and Effects Analysis/Critical Items List (FMEA/CIL) Requirements
SLS-RQMT-015	Space Launch System Program Hazard Analysis Requirements
SLS-RQMT-014	Space Launch System S&MA Requirements Document
SLS-RQMT-040	Space Launch System Program Electromagnetic Environmental Effects (E3) Requirements
SLS-PLAN-008	Space Launch System Program Configuration Management Plan
SLS-PLAN-013	Space Launch System Program Safety and Mission Assurance
NPR 8715.3	NASA General Safety Program Requirements Manual
NPR 8715.1	NASA Occupational Safety and Health Programs
NPR 8621.1	NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
NPR 8000.4	Risk Management Procedures and Guidelines
NPR 3792.1	Plan for Drug-Free Workplace
NPR 2200.2	Requirements for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information
NPD 8700.1	NASA Policy for Safety and Mission Success
NASA-STD-8719.13	NASA Software Safety Standard
NASA-STD-7009	Standards for Models and Simulations
NASA-STD-6016	Standard Materials and Processes Requirements for Spacecraft
NASA-STD-5002	Loads Analyses of Spacecraft and Payloads
NASA-HDBK-7009 NASA	NASA Handbook for Models and Simulations: An Implementation guide for NASA-STD-7009
MWI 8621.1	Mishap and Close Call Reporting and Investigation Program
MSFC-STD-3676	Development of Vibro-acoustic and Shock Design and Test Criteria
MSFC-STD-3394	Standard for Contractor Configuration Management Requirements, MSDC Programs/Projects
MSFC-STD-3029	Guidelines for the Selection of Metallic Materials for Stress Corrosion Cracking
MPR 7150.1	MSFC Software Engineering Requirements
MPR 7123.1	MSFC Systems Engineering Processes and Requirements
MPR 2220.1	Scientific and Technical Publications
MIL-STD-961	Defense and Program-Unique Specifications Format and Content
MIL-STD-130M	Department of Defense Standard Practices, Identification Marking of U.S. Military Property
ES22 (12-028)	Transportation and Handling Limit Load Factors
ASME Y14.5M	Dimensioning and Tolerance
ASME Y14.41	Digital Product Definition Data Practices
ASME Y14.100	Engineering Drawing Practices